
**NICORAEPOA (POACEAE,
POEAE), A NEW SOUTH
AMERICAN GENUS BASED ON
POA SUBG. ANDINAE, AND
EMENDATION OF POA SECT.
PARODIOCHLOA OF THE
SUB-ANTARCTIC ISLANDS¹**

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ABSTRACT

Poa subg. *Andinae* Nicora (Poaceae, tribe Poeae) is raised to the rank of genus, here renamed as *Nicoraepoa* Soreng & L. J. Gillespie. Six specific and one infraspecific combinations are made: *N. andina* (Trin.) Soreng & L. J. Gillespie, *N. chonotica* (Phil.) Soreng & L. J. Gillespie, *N. erinacea* (Speg.) Soreng & L. J. Gillespie, *N. pugionifolia* (Speg.) Soreng & L. J. Gillespie, *N. robusta* (Steud.) Soreng & L. J. Gillespie, *N. subenervis* (Hack.) Soreng & L. J. Gillespie, and *N. subenervis* subsp. *spgazziniana* (Nicora) Soreng & L. J. Gillespie. Lectotypes are designated for *N. pugionifolia* and *N. subenervis*. Taxonomy and nomenclature of similar Southern Hemisphere island species of *Poa* L. and other related genera are discussed. *Poa* sect. *Parodiochloa* (C. E. Hubb.) Soreng is emended to include, in addition to *P. flabellata* (Lam.) Raspail, *P. cookii* (Hook. f.) Hook. f., *P. foliosa* (Hook. f.) Hook. f., *P. hamiltoni* Kirk, *P. ramosissima* Hook. f., and *P. tennantiana* Petrie. The one species of *Tzvelevia* E. B. Alexeev is reunited with *Poa*, and the genus is transferred to *Poa* sect. *Tzvelevia* (E. B. Alexeev) Soreng & L. J. Gillespie. Morphological and anatomical characteristics of *Nicoraepoa*, *Poa* sect. *Parodiochloa*, and similar genera in Poinae are compared. Leaf blade morphology and anatomy were found to be particularly useful in characterizing *Nicoraepoa* and related taxa. A key is provided to distinguish *Nicoraepoa*, *Poa* sect. *Parodiochloa*, and morphologically similar perennial genera of Poinae.

Key words: *Austrofestuca*, *Bellardiochloa*, *Festucella*, *Hookerochloa*, *Nicoraepoa*, *Parodiochloa*, *Poa*, Poaceae, Poinae, *Tzvelevia*.

Poa subgen. *Andinae* Nicora (Poaceae, tribe Poeae) was described for a group of robust, tough, gynodioecious species from Patagonia having stolons or rhizomes, long staminodes (1–3 mm) in pistillate plants, smooth or scabrous lemmas with glabrous or pilose keel and nerves, and a callus that is glabrous or with rigid hairs to 3 mm long (Nicora, 1977). Some species also have awns at the lemma apex (e.g., *P. andina* Trin.; Nicora, 1978; Soreng, pers. obs.). Nicora (1978) included six species in *Poa* subgen. *Andinae* (*P. andina* Trin., *P. borchersii* Phil. (= *P. chonotica* Phil.), *P. erinacea* Speg., *P. pugionifolia* Speg., *P. robusta* Steud., *P. stepparia* Nicora), but retained the morphologically similar *P. flabellata* (Lam.) Raspail and *P. subenervis* Hack. in subgenus *Poa* as the latter

two are perfect-flowered. The lead author thought that the subgenus probably needed to be removed from *Poa* L. since he first saw material of the group in the early 1980s. With new material from collection trips to Chile in 2000–2001 (by R. and N. Soreng) and Argentina in 2001 (by P. M. Peterson, R. J. Soreng, N. Refulio, and M. Belgrano), the opportunity to study types and other specimens, and the continued study of the large genus *Poa* (ca. 500+ species), the morphological and anatomical distinctness of *Poa* subgen. *Andinae* has become clearer, supporting the conclusion that most species of the subgenus and *P. subenervis* (placed in *Poa* subgen. *Poa* by Nicora, 1978) do not belong in *Poa*. However, there was always uncertainty about whether the group repre-

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sented a new genus or could logically be placed within an existing genus in subtribe Poinae and, if it was distinct, how best to delimit it.

Several genera of Poinae had to be considered in the decision on how to treat *Poa* subgen. *Andinae*. Understanding the relationship of *P. flabellata* (sect. *Parodiochloa* (C. E. Hubb.) Soreng) to *P.* subgen. *Andinae* species was critical in deciding what genus name to use, because that species had been transferred to a new genus, *Parodiochloa* C. E. Hubb. (Hubbard, 1981). These groups share morphological features such as thick-ribbed leaf blade adaxial surfaces and awned lemma apices. Other genera morphologically similar to *Poa* subgen. *Andinae*, or otherwise putatively allied to *Poa* (Alexeev, 1976, 1985; García-González, 1983; Clayton & Renvoize, 1986), are *Austrofestuca* (Tzvelev) E. B. Alexeev s. str., *Bellardiochloa* Chiov., *Festucella* E. B. Alexeev, *Hookerchloa* E. B. Alexeev, and *Tzvelevia* E. B. Alexeev. As presently circumscribed, these genera include a total of only nine or 10 species that all, except for *Bellardiochloa* of southeastern Europe and the Middle East, occur in the Southern Hemisphere, in Australia, New Zealand, Tierra del Fuego, and on sub-Antarctic islands. All of the above genera have been controversial, and, except for *Bellardiochloa*, all their species were originally described in *Festuca* L. or other genera other than *Poa* and have since been placed in the above new genera and, in most cases, also in *Poa* (Hooker, 1844–1860; Alexeev, 1976, 1985; Clayton & Renvoize, 1986; Tzvelev, 1989; Jacobs, 1990; Watson & Dallwitz, 1992; Sharp & Simon, 2002; Soreng et al., 2003a; Gillespie & Soreng, 2005). *Poa flabellata*, for example, had also been placed in *Dactylis* L., *Festuca*, *Parodiochloa*, and *Sesleria* Scop.

Recent chloroplast DNA (cpDNA) analyses placed species of *Poa* subgen. *Andinae* outside of *Poa* in a clade with (Soreng et al., 2007) or near (Gillespie & Soreng, 2005; Gillespie et al., 2007) the panarctic genus *Arctagrostis* Griseb., while ITS data support a clade of these two taxa plus two Australian genera, *Festucella* and *Hookerchloa* (Gillespie et al., in prep.). Hunter et al. (2004) provided the first molecular evidence that the latter two genera, placed in *Austrofestuca* by Jacobs (1990), were closely related to each other and isolated from *Poa*, and that *Austrofestuca* s. str. could be included within *Poa*. The latter result was not unexpected as *A. littoralis* (Labill.) E. B. Alexeev is morphologically quite similar to *P. macrantha* Vasey. Additional molecular studies (Gillespie & Soreng, 2005; Gillespie et al., 2007; Soreng et al., 2007) and morphological comparisons have corroborated this result, and *Austrofestuca* is now treated as a monotypic section

of *Poa* (Gillespie & Soreng, 2005). *Parodiochloa*, which included the single species *Parodiochloa flabellata* (Lam.) C. E. Hubb., was also shown to belong within *Poa* and is now placed in its own section within *Poa* (Soreng et al., 2003a; Gillespie & Soreng, 2005; Gillespie et al., 2007). Resolution of the generic taxonomy problem remained incomplete, however, as there is also a small group of sub-Antarctic island species of *Poa* that were thought to be closely related to *Parodiochloa* (Edgar, 1986), and thus potentially related to *Poa* subgen. *Andinae*, and no molecular data were available for these or for the monotypic sub-Antarctic island genus *Tzvelevia*. Another genus of subtribe Poinae, the Eurasian genus *Bellardiochloa*, was previously placed in *Poa* (Clayton & Renvoize, 1986) or was thought to be closely related (García-González, 1983). Molecular analyses have consistently shown that *Bellardiochloa* does not belong within *Poa* (Soreng et al., 1990; Davis et al., 1993; Soreng & Davis, 2000), but it has only recently been demonstrated that this genus is not a sister to or direct ancestor of either *Poa* or *Poa* subgen. *Andinae* (Soreng et al., 2007; Gillespie et al., 2007).

The present paper outlines the nomenclature and taxonomy of a new genus established here to accommodate *Poa* subgen. *Andinae*. We discuss how it may be distinguished from *Poa* and other genera of Poeae subtribe Poinae, especially those genera thought to be most closely related. A revised taxonomy is also presented for the morphologically similar *Poa* sect. *Parodiochloa* and *Tzvelevia*, which here is reduced to a section in *Poa*. New data on leaf blade structural characters are presented and discussed here. Gillespie et al. (in prep.) will provide details and discussion of our new molecular analyses, including both plastid and nuclear DNA sequences, which support the taxonomic conclusions of this paper.

MATERIALS AND METHODS

Specimens, including types, were borrowed from the following herbaria: BAA, CONC, K, MO, SGO, and SI. Additional material was reviewed at BAB, HIP, LE, LP, SI, US, and W. Specimens at US were used for anatomical work. Additional representative specimens are cited as vouchers for geographic ranges of the species cited beyond those ranges vouchered in selected published works. Vouchers for taxa depicted in Figures 1–3 are given in the figure legends. Leaf surfaces were examined and photographed using a Philips XL30 ESEM LaB6 microscope (Eindhoven, The Netherlands) at the National Museum of Natural History, Smithsonian Institution. Sections of blades were taken from about 1 cm above the collar of lower culm leaves of herbarium specimens, attached to

stubs, and sputter coated with 12–18 nm of 60:40 gold:palladium alloy in a Cressington Scientific 108 Auto/SE (Watford, U.K.). Both leaf blade abaxial and adaxial surfaces were examined. Leaf trans-sectional anatomy was examined by cutting rough sections with a handheld razor blade and observing these under a dissecting microscope (50×) or a compound microscope (100×).

RESULTS AND DISCUSSION

VICORAEPOA—A NEW SOUTHERN SOUTH AMERICAN GENUS

Poa andina, *P. chonotica*, *P. erinacea*, *P. pugionifolia*, *P. robusta*, and *P. subenervis* are wetland plants that combine a set of characters that are either absent, rare, or unusual in other species of *Poa*. These characters include awned lemmas, a crown of callus hairs, basal sheaths becoming coarsely fibrous in age, ciliate ligules, corrugated adaxial leaf blade surfaces, pungent leafblade tips, and stout rhizomes. None of the species have all these features, but all share several of them (Table 1). The above species are hereafter referred to as *Nicoraepoa* Soreng & L. J. Gillespie species. All *Nicoraepoa* species occur in Patagonia and most are restricted to this area. Only *N. subenervis* subsp. *spgazziniana* (Nicora) Soreng & L. J. Gillespie extends slightly northward in the moderately high parts of the Andes to 32°04'S (San Juan province, Argentina). One species, *N. robusta* (Steud.) Soreng & L. J. Gillespie, reaches the Falkland/Malvinas Islands. Nicora (1978) provides an excellent key and illustrations to all these species in *Flora Patagónica*.

CHARACTERS DISTINGUISHING *NICORAEPOA* FROM *POA*

SEM anatomical investigations have advanced our understanding of *Poa* and surrounding genera and bolstered our opinion that *Poa* subgen. *Andinae* deserves generic status. *Nicoraepoa* differ from most *Poa* and related genera in the leaf blade adaxial surface (Figs. 1–3). *Nicoraepoa* leaf blade adaxial surfaces are covered by multiple, regularly spaced, tall, costal ridges that are broadly rounded to square- or rectangle-shaped on top and with intercostal valleys between the ridges that are deep, narrow, and smooth or sparsely to moderately densely scabrous (Fig. 1A–F). *Poa* (*Poa* type) leaf blades typically have relatively flat adaxial surfaces with only two central grooves, one on either side of the midrib (Fig. 3E, F) (Lewton-Brain, 1904; Vukolov, 1929; Prat, 1932; Metcalfe, 1960; Hernández Cardona, 1978; García-González, 1983). Costal ridges are present in *Poa*, but, with few exceptions, these are of low relief, narrow, and with intercostal zones

several times wider (Fig. 3E, F). Corrugated adaxial leaf blade surfaces like or approaching those in *Nicoraepoa* are rare in *Poa* but do occur in the following species: *P. cookii* (Hook. f.) Hook. f., *P. flabellata*, *P. foliosa* (Hook. f.) Hook. f., *P. hamiltonii* Kirk, *P. macrantha*, and *P. tennantiana* Petrie (Figs. 2E, F, 3A–C, H). *Nicoraepoa* species lack papillae on both long cells and short cells (Fig. 1A–F), whereas *Poa* species with costal/intercostal topography like or approaching *Nicoraepoa* (Figs. 2A–F, 3A–D) commonly have papillate long cells (Figs. 2E, F, 3A–C).

Vicoraepoa and *Poa* also differ in leaf blade internal anatomy and blade apex, ligule, and rhizome morphology, in addition to leaf adaxial-surface morphology. In leaf blade transections of *Nicoraepoa*, the adaxial ridges are underlain by sclerenchyma caps, or by prominent “T”- or “I”-shaped sclerenchyma girders connecting the adaxial surface through the primary vascular bundles to the abaxial surface (Tables 1, 2). Such broad caps or flared-topped girders have not previously been observed in *Poa* to our knowledge (Lewton-Brain, 1904; Vukolov, 1929; Prat, 1932; Metcalfe, 1960; Hernández Cardona, 1978; García-González, 1983). The apices of the blades in *Nicoraepoa* are pungent and are not or only obscurely prow-shaped, whereas in *Poa* they are commonly narrowly to broadly prow-shaped and are rarely pungent. In *Poa*, bulliform cells (visible in cross sections) occur only in the central two grooves; this is typical of Poinae genera with only two central grooves, including *Hookerchloa* and *Tzvelevia*. For those species with multiple broad ridges, we have seen bulliform cells only in the grooves immediately adjacent to the midrib, but more detailed anatomical cross-sectional work is needed to confirm this.

Nicoraepoa ligule apices (Figs. 4C, I, Q, 5B, F, K) are truncate (sometimes slightly raised on the outer margins; Fig. 5B), and ciliate to ciliate (hairs 0.15–0.6 mm long), whereas in *Poa* ligule apices vary in shape from truncate to acuminate, while the margins are commonly smooth or scabrid, or infrequently ciliate. *Nicoraepoa* species produce thick rhizomes that are mostly unidirectional. Many species of *Poa* have rhizomes, but apart from the few species of *Poa* subgen. *Arctopoa* (Griseb.) Prob., these rhizomes generally are more slender and sometimes have multidirectional shoots (Serebryakova, 1965).

Floret characters distinguishing *Nicoraepoa* and *Poa* include lemma shape, awn presence, and callus hair distribution and form. *Nicoraepoa* have lemma apices that are sharply pointed, and some are terminated by distinct slender scabrous awns up to 5 mm long. *Poa* typically have slightly blunt lemma apices that lack awns (except in *P. flabellata*). In

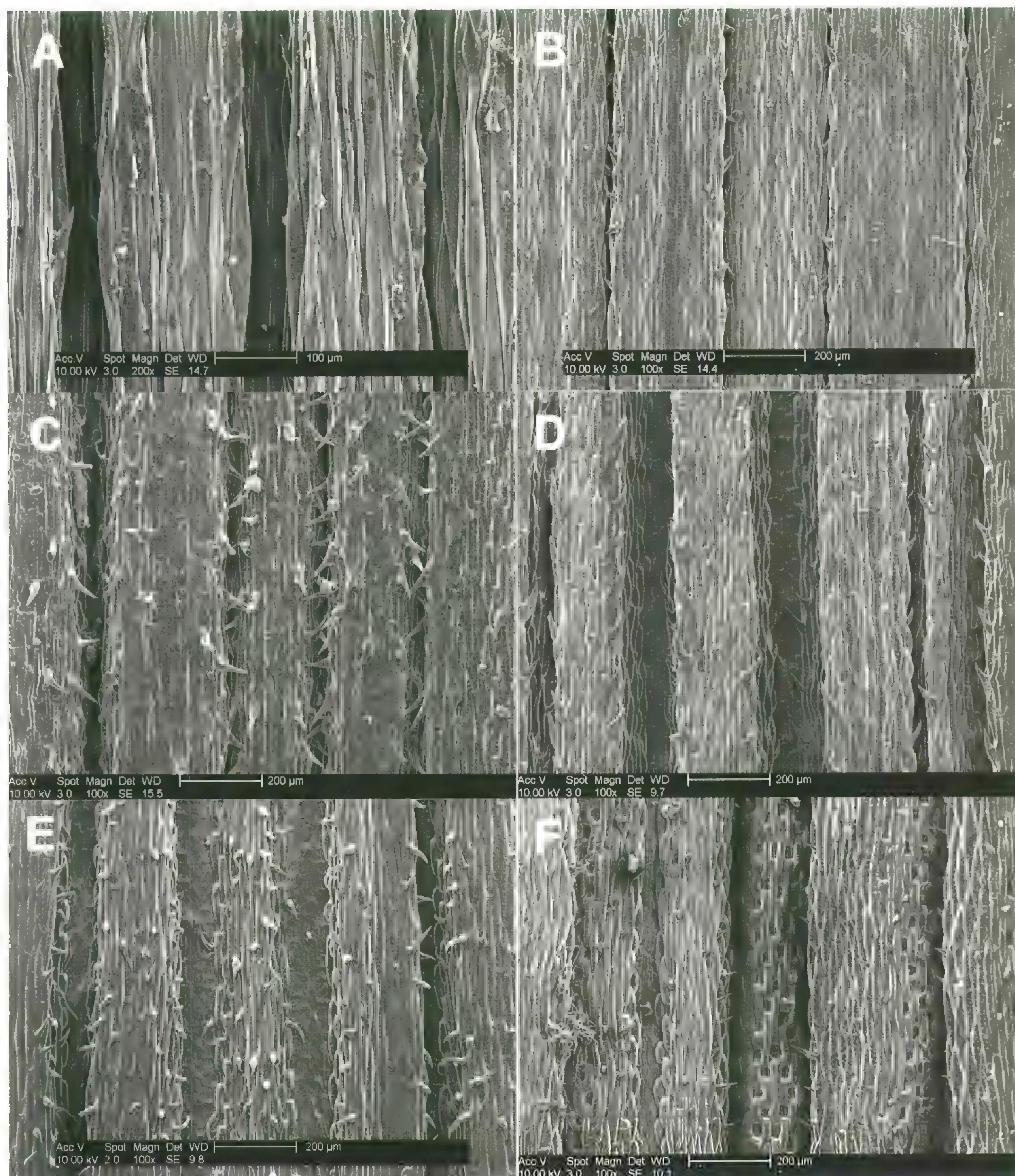


Figure 1. SEM photographs of adaxial surfaces of leaf blades of *Nicoraepoa* Soreng & L. J. Gillespie. —A. *N. andina* (Trin.) Soreng & L. J. Gillespie, Chile, Bío-Bío, R. J. & N. L. Soreng 7182 (US). —B. *N. chonotica* (Phil.) Soreng & L. J. Gillespie, Chile, Los Lagos, R. J. & N. L. Soreng 7236 (US). —C. *N. pugionifolia* (Speg.) Soreng & L. J. Gillespie, Chile, Magallanes, R. J. & N. L. Soreng 7336 (US). —D. *N. robusta* (Steud.) Soreng & L. J. Gillespie, Chile, Magallanes, R. J. & N. L. Soreng 7359 (US). —E. *N. subenervis* (Hack.) Soreng & L. J. Gillespie subsp. *subenervis*, Chile, Magallanes, R. J. & N. L. Soreng 7331 (US). —F. *N. subenervis* subsp. *spagazziniana* (Nicora) Soreng & L. J. Gillespie, Chile, Metropolitana, R. J. & N. L. Soreng 7167 (US).

Nicoraepoa, the calluses of the lemmas are glabrous (*P. robusta* only) or have a row of slightly curved hairs distributed around the base of the lemma. This row of callus hairs is called a crown, as distinct from a beard (commonly used to describe elongated calluses with short stiff hairs across and down the surface) or a web (an isolated dorsal tuft of hairs known only in the

genus *Poa*). A few *Poa* species have callus hairs in a crown (e.g., *P. eminens* J. Presl [subgenus *Arctopoa*], *P. secunda* J. Presl [section *Secundae* V. L. Marsh ex Soreng], and *P. obrallata* Steud. [section *Dioicopoa* E. Desv.]), but *Poa* species typically have a single dorsal tuft (a “web”) of woolly, or plicate (in section *Dioicopoa*), hairs. Some species of *Poa* with webs



Figure 2. SEM photographs of adaxial surfaces of leaf blades of genera of subtribe Poinae. —A. *Bellardiochloa variegata* (Lam.) Kerguelen. Left side abaxial epidermis and margin. Greece, Peloponnese, R. J. & N. L. Soreng & L. J. Gillespie 7519 (US). —B. *Festucella eriopoda* (Vickery) E. B. Alexeev. Left side abaxial epidermis and margin. Australia, New South Wales, E. N. McKie 7449 (US 2010746). —C. *Hookerochloa hookeriana* (F. Muell. ex Hook. f.) E. B. Alexeev. Australia, Tasmania, R. A. Black (US 1937360). —D. *Poa kerguelensis* (Hook. f.) Steud. (sect. *Tzvelevia* (E. B. Alexeev) Soreng & L. J. Gillespie). Right side abaxial epidermis and margin. Indian Ocean, Kerguelen Island, Wilkes Expedition (US 653666). —E. *Poa flabellata* (Lam.) Raspail (sect. *Parodiochloa* (C. E. Hubb.) Soreng). South Georgia, Admr. Berggren (US 2042368). —F. *Poa flabellata*. Close-up of costal intercostal region with papillate cells in intercostal region. South Georgia, Admr. Berggren (US 2042368).

have additional tufts of hairs emerging from the callus at the base of the marginal veins of their lemmas.

Reproductive characteristics also distinguish *Nicoraepoa* from most *Poa* (Nicora, 1977, 1978). All *Nicoraepoa* species, except *N. subenervis*, are gynodioecious with staminodes 1–3 mm long in pistillate

flowers (Fig. 4G, N). In contrast, *Poa* species are mostly perfect-flowered or, when diclinous, they generally have pistillate flowers with rudimentary staminodes 0.1–0.2 mm long (Nicora, 1978; Anton & Connor, 1995; Soreng & Keil, 2003; for exceptions, see Edgar & Connor, 2000; Negritto & Anton, 2000).



Figure 3. SEM photographs of adaxial surfaces of leaf blades in *Poa* L. A–D, *Poa*, sect. *Parodiochloa* (C. E. Hubb.) Soreng. —A, *P. cookii* (Hook. f.) Hook f. Indian Ocean, Marion and Prince Edward Islands, B. J. Huntly (US 3000037). —B, *P. foliosa* (Hook. f.) Hook f. New Zealand, The Snares, F. L. S. Demedin s.n. [hb. D. Petrie] (US 947494). —C, *P. ramosissima* Hook. f. Midrib just left of center, New Zealand, Campbell's Island, J. H. Sorensen (US 2184040). —D, *P. tennantiana* Petrie, New Zealand, The Snares, B. C. Aston [hb. 31857] (US 2044107 (ex hb. Cheeseman)). —E, *P. alpina* L. (sect. *Alpinae* Stapf).

ADDITIONAL TAXONOMIC AND MORPHOLOGICAL
CONSIDERATIONS CONCERNING PARTICULAR SPECIES

Nicora (1977, 1978) excluded *Poa subenervis* from her subgenus *Andinae* because it has perfect flowers. However, we consider it to belong in *Nicoraepoa* because it shares the stout rhizomatous habit, the adaxial leaf surface anatomy of broad ridges and narrow valleys (Fig. 1E, F), sharply pointed leaf apices, ciliate ligules, and calluses with a crown of hairs (Figs. 4E, L, 5D, M, N). DNA analyses from both nuclear and plastid genomes support this relationship (Gillespie et al., 2007; Gillespie et al., in prep.).

Poa stepparia, although placed in *Poa* subgen. *Andinae* by Nicora (1977, 1978), needs further study before it can be placed in the new genus. Leaf blade adaxial surfaces of this species are of the *Poa* type with ridges that are only indistinctly raised. The leaf blade apices are pungent, the lemmas lack awns, calluses are glabrous or the marginal vein and keel hairs run into the callus, and the ligules are slightly raised on the sides with somewhat asperous margins. This species was thought to be related to *P. acinaciphylla* E. Desv. (Nicora, 1978), and Soreng et al. (2003a) placed both these species and *P. planifolia* Kuntze in *Poa* sect. *Acutifoliae* Pilg. ex Potztl. We concur with M. Negritto (pers. comm.) that *P. plicata* Hack. (type and sole species of *Poa* sect. *Plicatae* Pilg. ex Potztl) also belongs to this section and place *Poa* sect. *Plicatae* in synonymy of *Poa* sect. *Acutifoliae* (see Taxonomic Treatment section). Analyses of chloroplast and nuclear ITS data confirm *P. acinaciphylla* as a member of *Poa* s. str. (Gillespie & Soreng, 2005; Gillespie et al., 2007; Gillespie et al., unpublished data). *Poa stepparia*, however, is only known from the type and two other collections (Nicora, 1978), and no material has been available for molecular or SEM analyses; its relationships and breeding system need confirmation.

RELATIONSHIPS OF *NICORAEPOA*

Initial cpDNA results from *trnT-trnF* (Gillespie & Soreng, 2005; Gillespie et al., 2007), plus new nuclear ribosomal ITS data (Gillespie et al., in prep.), show that the *Nicoraepoa* taxa align in a clade outside of

Poa and can logically be placed in a separate genus as they do not fall within any other genus. Species sampled for DNA to date are *N. andina*, *N. chonotica*, *N. pugionifolia*, *N. robusta*, and *N. subenervis*. Preliminary results resolve *Arctagrostis*, *Festucella*, and *Hookerochloa* as the closest genera to *Nicoraepoa*. The relationship of this set of genera to other Poinae genera, *Arctophila* (Rupr.) Rupr. ex Andersson, *Bellardiochloa*, *Dupontia* R. Br., and *Poa* (including *Anthochloa* Nees & Meyen, *Austrofestuca*, *Dissanthellium* Trin., *Eremopoa* Roshev., *Neuropoa* Clayton), is unsettled. Molecular relationships among genera of subtribe Poinae and intermixed genera of Poeae subtribes Alopecurinae and Miliinae are complex and are not yet well resolved or understood. Further sampling is needed before firm conclusions about exact relationships can be drawn (Soreng & Davis, 2000; Gillespie & Soreng, 2005; Soreng et al., 2007; Gillespie et al., 2007; Gillespie et al., unpublished data).

Genera of Poinae thought to be related to *Nicoraepoa* and *Poa* are discussed below, and their morphological characteristics, including leaf blade adaxial surface (Figs. 2A–F, 3G), are compared. *Festucella* and *Hookerochloa* are two closely related genera of Australia and New Zealand. Although sometimes treated within *Austrofestuca* (Clayton & Renvoize, 1986; Jacobs, 1990; Sharp & Simon, 2002), recent molecular data support their separate recognition (Hunter et al., 2004; Gillespie et al., 2007). With *Nicoraepoa*, they share wetland habitats, fibrous basal sheaths, awned lemmas, and a short crown of hairs around the callus, but their leaf blades are *Poa*-like in adaxial anatomy (Fig. 2B, C). The relationships among the Arctic genus *Arctagrostis* and the Southern Hemisphere genera *Nicoraepoa*, *Festucella*, and *Hookerochloa* detected in our molecular analyses need further investigation. ITS data place *Arctagrostis* plus *Nicoraepoa* as sister to *Festuca* plus *Hookerochloa*, but relationships detected with our plastid data are less well resolved at this point. The one-flowered spikelets of *Arctagrostis* are impossible to confuse with the several-flowered spikelets of the other three genera. Its broad, flat leaf blades with narrow, low costal ridges and broad intercostal zones (not shown) do not resemble the blades of these genera.

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Close-up of central region of blade with rows of bulliform cells (protruding here in the intercostal regions) flanking either side of the midvein. Canada, British Columbia, R. J. & J. E. F. Soreng 5991 (US). —F. *P. pratensis* L. (sect. *Poa*). Narrow costal regions with elongated hairs characteristic of the species. Canada, British Columbia, R. J. & J. E. F. Soreng 5987 (US). —G. *P. billardiarii* St.-Yves (sect. *Austrofestuca* (Tzvelev) Soreng & L. J. Gillespie). New Zealand, South Island, V. D. Zotov (US 2010241). —H. *P. macrantha* Vasey (sect. *Madropoa* Soreng). Showing the presence of a more corrugated costal–intercostal surface, a rare exception in *Poa* (and *P. macrantha*). U.S.A., Oregon, R. J. Soreng 2959 (US).

Table 1. Morphological comparison of species of *Nicoraepoa* and morphologically similar Poinae genera (except *Poa*, which is given in Table 2).

	<i>Arctophila fulva</i> Nyman	<i>Bellardiochloa variegata</i>	<i>Dupontia fisheri</i> R. Br.	<i>Festucella eriopoda</i>	<i>Hookerochloa hookeriana</i>	<i>Nicoraepoa andina</i>	<i>Nicoraepoa chonotica</i>	<i>Nicoraepoa erinacea</i>	<i>Nicoraepoa pugionifolia</i>	<i>Nicoraepoa robusta</i>	<i>Nicoraepoa subenervis</i>
Habitat	arctic tundra and northern boreal wetlands, shallow ponds, marshy meadows, swamps, and quiet streams	grassy alpine meadows, commonly over sedimentary rocks	arctic tundra wetlands, mainly coastal, marshy meadows, marginally sub- saline tolerant	montane forest openings near wetlands	montane wetlands	alpine and subalpine riparian and seeps	montane to sea level wetlands, marshes, and lake shores	inland sub-saline flats	inland seasonal wetlands, and sub-saline flats and seeps	coastal saline to sub-saline marshes and seeps	montane sub- saline wetlands, about seeps and springs
Habit, culm height	rhizomatous, 0.05–1 m	densely tufted, 0.09–0.6 m	rhizomatous, 0.05–0.8 m	low tufts, culms 0.50–1.6 m	large tufts, culms 0.55–1.85 m	tufts from a stout little branched rhizome, to 1 m	tufts from a stout little branched rhizome, to 2 m	low tufts from stout little branched rhizomes, 0.07–0.15 cm	low tufts from stout little branched rhizomes, 0.2–0.3 m	tufts from a stout little branched rhizome, to 1 m	low tufts from stout little branched rhizomes, 0.15–0.6 m
Basal sheaths	chartaceous, smooth, retroresely strigose, to finely fibrous with cross- vein connections	chartaceous, weakly fibrous	chartaceous, or a bit fibrous, smooth, glabrous to sparingly retroresely strigose	fibrous	fibrous	fibrous, smooth	fibrous, smooth	somewhat fibrous, smooth	somewhat fibrous, smooth	fibrous, smooth	somewhat fibrous, smooth
Blade adaxial lateral surface topography	rounded tall to medium height ridges 0.25–1× wider than valleys (similar to abaxial surface)	medium height, rounded ridges 1× wider than valleys, valleys open	flat or faintly undulating	flat or faintly undulating, obscure ridges	flat	tall flat-topped ridges 2–4× wider than valleys, valleys closed	tall flat-topped ridges 3–5× wider than valleys, valleys closed	flat	tall flat-topped ridges 2–3× wider than valleys, valleys closed	tall flat-topped ridges 2–3× wider than valleys, valleys closed	middle height rounded ridges 1–2× wider than valleys, valleys open or closed

Table 1. Continued.

	<i>Arctophila fulva</i> Nyman	<i>Bellardiochloa variegata</i>	<i>Dupontia fisheri</i> R. Br.	<i>Festucella eriopoda</i>	<i>Hookerchloa hookeriana</i>	<i>Nicoraepoa andina</i>	<i>Nicoraepoa chonotica</i>	<i>Nicoraepoa erinacea</i>	<i>Nicoraepoa pugionifolia</i>	<i>Nicoraepoa robusta</i>	<i>Nicoraepoa subenervis</i>
Blade lateral adaxial surface vestiture	smooth, glabrous	ridge tops and sides coarsely hispidulous	smooth or moderately scabrous, glabrous	short stout hooks common to very common, glabrous	short stout hooks common over VBs, glabrous	ridge sides with slender hooks occasional, glabrous	ridge sides and sometimes tops with minute hooks common, glabrous	fairly densely hispidulous- strigulose	ridge sides with hooks common, ridge tops with short hooks occasional, glabrous	ridge sides and sometimes tops with short hooks common, glabrous	ridge sides with short hooks occasional to common, glabrous
Girdering	I-shaped, thick, present in primaries, keel, and most secondaries, keel girdered, abaxially thick, round in cross section	I-shaped, thin, or more often discontinuous, with narrow caps over VBs and low mounds below, keel VB continuous to lower side and with an isolated cap above	I-shaped, thin, usually continuous, but quite narrow and sometimes broken just above the VBs (lacunae below adaxial epidermis)	discontinuous, low basal mounds only	I-shaped primaries, secondaries discontinuous to adaxial side	T-shaped primaries and keel	T-shaped primaries and keel	N/K	caps below ridges, no girders, narrow isolated U below keel	T-shaped primaries and keel	I-shaped, narrow, present in primaries, keel, and some secondaries
Abaxial sclerenchyma along epidermis	discontinuous	discontinuous	discontinuous	discontinuous	discontinuous	discontinuous	discontinuous	discontinuous?	discontinuous	discontinuous	discontinuous
Vascular bundles appearing at adaxial surface	10 to 17/side, alternating primaries and slightly smaller secondaries	3 to 4/side	5 to 8/side	2/side	6/side (12/side abaxially)	10 to 11/side	24/side	2/side	5/side	7/side	5 to 12/side
Ligule texture, color	membranous, white or bronzy	membranous, white	membranous, bronzy	chartaceous, white	chartaceous, white	membranous- chartaceous, white	membranous- chartaceous, white	membranous- chartaceous, white	membranous- chartaceous, white	membranous- chartaceous, white	membranous, white
Ligule length	2–6(8) mm	2–7 mm	1–2.5 mm	1–3 mm, 2–7 mm on basal shoots	2–6 mm	1–3 mm	1–3 mm	0.5 mm	0.5–2.5 mm	0.8–1.5 mm	1–1.5 mm

Table 1. Continued.

	<i>Arctophila fulva</i> Nyman	<i>Bellardiochloa variegata</i>	<i>Dupontia fisheri</i> R. Br.	<i>Festucella eriopoda</i>	<i>Hookerachloa hookeriana</i>	<i>Nicoraepoa andina</i>	<i>Nicoraepoa chonotica</i>	<i>Nicoraepoa erinacea</i>	<i>Nicoraepoa pugionifolia</i>	<i>Nicoraepoa robusta</i>	<i>Nicoraepoa subenervis</i>
Ligule abaxial surface	smooth, glabrous	smooth or somewhat scabrous, glabrous	smooth, glabrous	with short hooks common, glabrous	with short hooks frequent, glabrous	hispidulous	densely covered with short thick appressed hairs to hispidulous	smooth or with sparse short stiff hairs	densely covered with hooks to short thick hairs	densely covered with short thick appressed hairs to hispidulous	densely hispidulous
Collar margins	smooth, glabrous	smooth or scabrous	smooth, glabrous	scabrous	smooth or sparsely scabrid	hispidulous	hispidulous	hispidulous	hispidulous	hispidulous	ciliate
Inflorescence shape, length	open lax, 5– 30 cm	contracted or loosely contracted, 5–25 cm	contracted or open panicle, 3–18 cm	open, 4.5–40 cm	open, 18–24 cm	contracted, interrupted, 5–20 cm	loosely contracted and interrupted to open lax, 5– 30 cm	contracted, narrow, 2.5– 4.5 cm	contracted, narrow, 3– 6 cm	contracted, or in viviparous forms loosely contracted	contracted narrow panicle or sometimes lax loose
Panicle branches	smooth	branches densely scabrous	smooth	densely scabrous angled	densely scabrous angled	smooth	smooth	densely ciliate scabrid angled	moderately scabrid angled	smooth	smooth
Lemma awn	absent or occasionally with a cusp to 0.8 mm long	slender cusp or awn 0.5–1.5 mm long, from the apex or a short notch	absent or occasionally with cusp or thin awn up to 0.6 mm long	apiculate to slender awn (0–)0.5–1.5 (–2) mm long, from a minute notch	slender awn 0.5–2(–3) mm long, from a minute notch	short slender awn 0.5– 3(–5) mm long	apiculate	apiculate	absent to apiculate	absent to apiculate	apiculate
Callus	with crown of straight hairs around the base, hairs 0.3–0.7 mm long	with crown of hairs 0.3–0.6 mm long	with crown of coarse hairs 0.5–1.2 mm long	with crown of hairs 0.4– 0.6 mm long	with crown of hairs 0.3– 0.6 mm long	with crown of slender hairs 2–3 mm long	with crown of slender hairs 1–2.5 mm, long	with crown of hairs 0.2– 0.3 mm long	glabrous	glabrous	with crown of hairs 0.4– 1.5 mm long
Lodicule length, shape, and margin	with a lateral lobe	irregularly dentate or with 1 to 2 slender lobes in addition to main slender lobe, glabrous or ciliate	usually with a lateral lobe	0.5 mm, lobed as in a mitten, or shouldered at midpoint, glabrous	0.8 mm, lobed as in a mitten or shouldered at midpoint, glabrous or with 1 or 2 cilia	0.9–1 mm, lanceolate to irregularly slender lobed, glabrous or with a cilia	1.5 mm, broadly lanceolate glabrous	N/K	0.9 mm, irregularly lobed or shouldered, glabrous	1.7 mm, broadly lanceolate glabrous	0.5–0.8 mm, lanceolate, irregularly toothed, glabrous

Table 1. Continued.

	<i>Arctophila fulva</i> Nyman	<i>Bellardiochloa variegata</i>	<i>Dupontia fisheri</i> R. Br.	<i>Festucella eriopoda</i>	<i>Hookerochloa hookeriana</i>	<i>Nicoraepoa andina</i>	<i>Nicoraepoa chonotica</i>	<i>Nicoraepoa erinacea</i>	<i>Nicoraepoa pugionifolia</i>	<i>Nicoraepoa robusta</i>	<i>Vicoraepoa subenervis</i>
Caryopsis shape	fusoid, with a distinct sulcus	fusoid, sub-cylindrical to subtriagonous, sulcus indistinct to moderately distinct	fusoid, subtriangular, with an indistinct sulcus	fusoid, subtriangular, sulcus distinct	fusoid, subtriangular, sulcus distinct	fusoid, subtriangular, sulcus distinct	fusoid, subtriangular, sulcus distinct	N/K	fusoid, subtriangular, sulcus distinct	fusoid, subtriangular, sulcus distinct	fusoid, subtriangular, sulcus distinct
Fruit length, hilum length, hilum shape	1.5–2 mm, 0.25 mm, broadly ovate to punctiform	1.8–2.5 mm, 1/8–1/6 length of grain, ovoid to punctiform	1.5–2.5 mm long, 1/6–1/5 length of grain, broadly ovate	3 mm, 0.6 mm, narrowly elliptical	3.8 mm, 0.8 mm, elliptical	2 mm, 0.4 mm, elliptical	3 mm, 0.8 mm, narrowly elliptical	N/K	3 mm, 0.4 mm, elliptical	3.4 mm, 0.6 mm, narrowly elliptical	2.2 mm, 0.4 mm, elliptical to broadly elliptical
Lipid presence, caryopsis firmness	N/K	present, firm to semi-soft	N/K	present, firm	present, firm	present, firm	present, firm	N/K	present, firm to semi-soft	present, firm	present, firm
Styles, stigma	bases with a gap, plumose	bases with a gap, plumose	bases with a gap, plumose	bases with a gap, plumose	bases with a gap, plumose	bases with a gap, plumose	bases with a gap, plumose	bases with a gap, plumose	bases with a gap, plumose	bases with a gap, plumose	bases with a gap, plumose
Chromosomes	2n = 42, 63	2n = 14	2n = 42, 44, 88, 132	N/K	N/K	N/K	N/K	N/K	N/K	N/K	N/K

VB = vascular bundles; N/K = not known.

Table 2. Morphological comparison of species of *Poa* sect. *Parodiochloa* and morphologically similar *Poa* sections.

	<i>Poa</i> (subg. <i>Arctopoa</i>) sect. <i>Aphydris</i> (Griseb.) Tzvelev	<i>P.</i> (subg. & sect. <i>Arctopoa</i>) <i>eminens</i>	<i>P.</i> (sect. <i>Austrofestuca</i>) <i>billardierei</i>	<i>P.</i> (sect. <i>Parodiochloa</i>) <i>cookii</i>	<i>P.</i> (sect. <i>Parodiochloa</i>) <i>flabellata</i>	<i>P.</i> (sect. <i>Parodiochloa</i>) <i>foliosa</i>	<i>P.</i> (sect. <i>Parodiochloa</i>) <i>hamiltonii</i>	<i>P.</i> (sect. <i>Parodiochloa</i>) <i>ramosissima</i>	<i>P.</i> (sect. <i>Parodiochloa</i>) <i>tennantiana</i>	<i>P.</i> (sect. <i>Tzveleria</i>) <i>kerguelensis</i>	<i>Poa</i> (other than those separated)
Habitat	steppe and alpine, riparian and sub-saline seasonally wet flats, sub- saline springs	coastal, wet meadows, rocky beaches, sub-saline	coastal sand dunes and sandy to shingly flats	coastal, among rocks and peat mounds, and on slopes, often associated with penguin colonies	coastal, bluffs, meadows and rocky ledges	coastal slopes, sometimes coastal strand turfy meadows	coastal, among rocks and peat mounds, and on slopes, often associated with penguin colonies	coastal, wet rocks and cliffs, commonly associated with bird colonies	coastal, forest margins, clearings in scrub, and on banks	rocky oceanic island slopes 100–400 m	all cool temperate to arctic habitats, generally intolerant of saline conditions
Habit, culm height	rhizomatous or infrequently stooling, to 1.15 m	rhizomatous, to 1 m	dense tufts from deeply buried culms which may appear like rhizomes, to 0.6 m	robust dense tussocks, to 0.5 m	massive tussocks, to 1 m	massive tussocks with short thick stolons, to 1.5 m	dense tussocks, to 0.5 m	weak culmed, stoloniferous, culms prostrate, distally erect	tufts from stout rhizomes, to 1 m	dense, low tufts, to 0.15 m	perennial or infrequently annual, tufted, rhizomatous, or stooling
Basal sheaths	fibrous and chartaceous, smooth, retrorsely strigose	chartaceous, smooth, retrorsely strigose	fibrous, smooth, glabrous	fibrous, pectinate ciliate between ridges	fibrous, pectinate ciliate between ridges	fibrous, smooth, glabrous	fibrous, smooth, glabrous	papillate, glabrous	fibrous, pectinate ciliate between ridges	finely fibrous, glabrous	not becoming fibrous or rarely becoming fibrous, smooth or finely scabrous particularly along ridges, glabrous or infrequently hispidulous
Blade adaxial lateral surface topography	flat	flat or slightly undulate	flat or faintly undulating	tall flat-topped ridges 3–4× wider than valleys, valleys closed	low to medium height rounded ridges, 1–2× wider than valleys, valleys open (abaxial similarly ribbed)	low flat-topped ridges 1–2× wider than valleys, valleys closed or open and shallow	low flat-topped ridges 1–2× wider than valleys, valleys slightly open	low flat-topped ridges 2–3× wider than valleys, valleys open	low flat-topped ridges 1–2× wider than valleys, valleys slightly open	flat	flat or infrequently ridges slightly raised, ridges 0.2–1× wider than valleys, valleys open

Table 2. Continued.

	<i>Poa</i> (subg. <i>Arctopoa</i>) sect. <i>Aphydris</i> (Griseb.) Tzvelev	<i>P.</i> (subg. & sect. <i>Arctopoa</i>) <i>eminens</i>	<i>P.</i> (sect. <i>Austrofestuca</i>) <i>billardierei</i>	<i>P.</i> (sect. <i>Parodiochloa</i>) <i>cookii</i>	<i>P.</i> (sect. <i>Parodiochloa</i>) <i>flabellata</i>	<i>P.</i> (sect. <i>Parodiochloa</i>) <i>foliosa</i>	<i>P.</i> (sect. <i>Parodiochloa</i>) <i>hamiltonii</i>	<i>P.</i> (sect. <i>Parodiochloa</i>) <i>ramosissima</i>	<i>P.</i> (sect. <i>Parodiochloa</i>) <i>tennantiana</i>	<i>P.</i> (sect. <i>Tzvelevia</i>) <i>kerguelensis</i>	<i>Poa</i> (other than those separated)
Blade lateral adaxial surface vestiture	smooth, glabrous	smooth, glabrous	densely coarsely scabrous to stiffly puberulent	valleys to ridge margins densely papillate to minutely scabrid, sometimes with additional larger slender hooks occasional, glabrous	valleys papillate, ridge sides with slender hooks frequent, glabrous	valleys to ridge margins densely papillate, ridge tops with thick- bodied hooks common, glabrous	valleys to ridge margins densely papillate, glabrous	valleys to ridge margins densely papillate, glabrous	smooth or sparsely papillate, rarely minutely scabrid on ridges, glabrous	short stout hooks frequent, glabrous	smooth or costally scabrid, or infrequently generally scabrid or hispid puberulent or pilulose, rarely papillate
Girdering	I-shaped primaries	I-shaped primaries, narrow I- shaped secondaries, tertiaries without girders	I- or Λ-shaped VB, primaries, and secondaries progressively reduced to margin, narrowest at contact of adaxial epidermis, keel thickest	T-shaped primaries to I-shaped secondaries, bases thick, capitals sometimes discontinuous just above VBs, and in keel, thick in lower keel	I shaped primaries, thick hourglass shape, secondaries slightly narrower, continuous between VBs in primaries and secondaries, keel isolated U shape below	I-shaped primaries, thick, secondaries free, continuous between VBs in primaries, secondaries free above and below VBs, keel girdered above with isolated mound below	T-shaped primaries slender, to I- shaped secondaries	I-shaped primaries, continuous between VBs except in keel, keel with isolated mound below	I-shaped primaries, thick, secondaries mostly continuous, keel VBs girdered above with mound connected below	discontinuous, low basal mounds only, isolated keel U capped below	I-shaped or discontinuous, sometimes discontinuous above or below, primaries and secondaries common
Abaxial sclerenchyma along epidermis	discontinuous	discontinuous	continuous, thickest below VBs	discontinuous	discontinuous	discontinuous	discontinuous	discontinuous	discontinuous	discontinuous	discontinuous or rarely continuous between VBs

Table 2. Continued.

	<i>Poa</i> (subg. <i>Arctopoa</i>) sect. <i>Aphydris</i> (Griseb.) Tzvelev	<i>P.</i> (subg. & sect. <i>Arctopoa</i>) <i>eminens</i>	<i>P.</i> (sect. <i>Austrofestuca</i>) <i>billardierei</i>	<i>P.</i> (sect. <i>Parodiochloa</i>) <i>cookii</i>	<i>P.</i> (sect. <i>Parodiochloa</i>) <i>flabellata</i>	<i>P.</i> (sect. <i>Parodiochloa</i>) <i>foliosa</i>	<i>P.</i> (sect. <i>Parodiochloa</i>) <i>hamiltonii</i>	<i>P.</i> (sect. <i>Parodiochloa</i>) <i>ramosissima</i>	<i>P.</i> (sect. <i>Parodiochloa</i>) <i>tennantiana</i>	<i>P.</i> (sect. <i>Tzvelevia</i>) <i>kerguelensis</i>	<i>Poa</i> (other than those separated)
Vascular bundles appearing at adaxial surface	5 to 7/side	8 to 9/side	5/side	16 to 21/side, primaries mainly	10 to 17/side, primaries mainly	12 to 17/side, primaries mainly	6 to 15(21?)/side, primaries and secondaries	5 to 6/side	15 to 17/side, secondaries frequent	3/side	2 to 11/side
Ligule texture, color	membranous to membranous-chartaceous, off-white to yellowish or brownish	membranous-chartaceous, yellow-cream to brown	chartaceous laterally, membranous-chartaceous centrally, white	chartaceous-membranous, white	chartaceous basally to membranous apically, white	chartaceous, white	membranous-chartaceous, white	membranous, white	chartaceous basally to membranous apically, white	membranous, white	membranous, white or clear
Ligule length	1–4(5.5) mm	1–3.5 mm	0.7–1 mm	4–7.5 mm	6–23 mm	1–3 mm	4–7.5 mm	(1.5)2.5–4 mm	6–16 mm	ca. 3 mm	0.2–18 mm
Ligule abaxial surface	scabrous, glabrous	smooth, glabrous	moderately scabrous, glabrous	smooth, glabrous	with occasional short hooks, glabrous	densely covered with short thick appressed hairs (finely scabrous, f. Edgar, 1985)	smooth, glabrous	smooth, glabrous	densely papillate, glabrous	scabrid to puberulent	smooth, scabrous, or short puberulent
Collar margins	smooth, glabrous or ciliate	smooth, glabrous	smooth, glabrous	smooth, glabrous	smooth, glabrous	smooth, glabrous	smooth, glabrous	smooth to papillate	smooth to ciliate	smooth or sparsely scabrid, glabrous	glabrous or infrequently puberulent
Inflorescence shape, length	open or contracted, 5–35 cm	contracted, 8–30 cm	narrowly contracted, (3.5–)6–25 cm	contracted, 5–25 cm	tightly contracted, dense, branches and axis somewhat contorted, 5–20 cm	contracted, fairly dense, 10–20 cm	contracted, 5–25 cm	narrow, loosely contracted, (2)4–5(10) cm	loosely contracted, 9–16 cm	narrowly contracted, 2–4 cm	tightly contracted to wide open and lax

Table 2. Continued.

	<i>Poa</i> (subg. <i>Arctopoa</i>) sect. <i>Aphydris</i> (Griseb.) Tzvelev	<i>P.</i> (subg. & sect. <i>Arctopoa</i>) <i>eminens</i>	<i>P.</i> (sect. <i>Austrofestuca</i>) <i>billardierei</i>	<i>P.</i> (sect. <i>Parodiochloa</i>) <i>cookii</i>	<i>P.</i> (sect. <i>Parodiochloa</i>) <i>flabellata</i>	<i>P.</i> (sect. <i>Parodiochloa</i>) <i>foliosa</i>	<i>P.</i> (sect. <i>Parodiochloa</i>) <i>hamiltonii</i>	<i>P.</i> (sect. <i>Parodiochloa</i>) <i>ramosissima</i>	<i>P.</i> (sect. <i>Parodiochloa</i>) <i>tennantiana</i>	<i>P.</i> (sect. <i>Tzvelevia</i>) <i>kerguelensis</i>	<i>Poa</i> (other than those separated)
Panicle branches	smooth to densely scabrous angled	smooth or sparsely scabrous	smooth below, coarsely spreading scabrous all around distally and on pedicels (rarely sparsely so)	smooth, densely papillate, sometimes coarsely scabrous, the hooks spreading (and then papillae obscure)	smooth	smooth or with a few hooks	smooth, densely papillate	smooth, densely papillate	occasionally smooth, commonly sparsely scabrous above and on pedicels	densely scabrid on and less so between angles	smooth or scabrous (rarely papillate), hooks diffuse or more often in lines above vascular traces, glabrous or rarely hispidulous absent or rarely cuspidate
Lemma awn	absent	absent	absent	cuspidate	cuspidate to short stout awn	cuspidate	cuspidate	cuspidate	cuspidate	absent or cuspidate	
Callus	glabrous, or with 1 to several straight hairs (to 1.5 mm long) dorsally and below the marginal veins	usually with a line of 1–2 mm long slightly sinuous hairs around base of proximal lemmas, sometimes all glabrous	short crown of hairs around the callus, hairs stiff, 0.5– 0.8 mm long	glabrous or with a loose crown of coarse slightly sinuous hairs	glabrous	dense tuft of crinkled hairs dorsally, sometimes with a few hairs laterally	glabrous	glabrous or with dorsal tuft of hairs, sometimes with a few hairs laterally, hairs closely sinuous to crinkled	glabrous	glabrous	mostly with a dorsal web, sometimes glabrous, infrequently with a crown of hairs or a diffuse web
Lodicule length, shape, and margin	0.9 mm, deeply to shallowly lobed, glabrous	1.5 mm, obovate, with a small lateral lobe, glabrous	1.25–1.5 mm, with 2 broadly lanceolate lobes, lobes with a few apical short cilia	0.8–0.9 mm, obovate, margin with or without a few cilia along the upper margins	0.6 mm, with 2 lobes, with or without 1 or 2 cilia	0.4–0.7 mm, weakly lobed, glabrous, infrequently or rarely with 1 or 2 cilia	0.9 mm, infrequently or rarely with 1 or 2 cilia	0.3–1 mm, with a lateral tooth, glabrous or infrequently with 1 or 2 cilia	0.5–0.8 mm, N/K, N/K	0.8 mm, lobed or shouldered at midpoint, glabrous	generally lobed as in a mitten. infrequently glabrous or rarely with 1 or 2 cilia in some New Zealand species (f. Edgar, 1885)

Table 2. Continued.

	<i>Poa</i> (subg. <i>Arctopoa</i>) sect. <i>Aphydris</i> (Griseb.) Tzvelev	<i>P.</i> (subg. & sect. <i>Arctopoa</i>) <i>eminens</i>	<i>P.</i> (sect. <i>Austrofestuca</i>) <i>billardierei</i>	<i>P.</i> (sect. <i>Parodiochloa</i>) <i>cookii</i>	<i>P.</i> (sect. <i>Parodiochloa</i>) <i>flabellata</i>	<i>P.</i> (sect. <i>Parodiochloa</i>) <i>foliosa</i>	<i>P.</i> (sect. <i>Parodiochloa</i>) <i>hamiltonii</i>	<i>P.</i> (sect. <i>Parodiochloa</i>) <i>ramosissima</i>	<i>P.</i> (sect. <i>Parodiochloa</i>) <i>tennantiana</i>	<i>P.</i> (sect. <i>Tzvelevia</i>) <i>kerguelensis</i>	<i>Poa</i> (other than those separated)
Caryopsis shape	fusoid, subtriangular, sulcus distinct	fusoid, sub- triangular, sulcus distinct	apically blunt, subpentangular, sulcus pronounced	fusoid, nearly cylindrical, sulcus indistinct	fusoid, sub- triangular, sulcus distinct	fusoid, nearly round to subtriangular, sulcus indistinct	fusoid, nearly cylindrical, sulcus indistinct	fusoid	fusoid, nearly cylindrical, sulcus indistinct	narrowly fusoid, subtriangular, sulcus distinct	fusoid, subtri- angular, or nearly cylindrical, sulcus distinct, or faint
Fruit length, hilum length, hilum shape	2-? mm, 0.4-? mm, elliptical	2.5-4.5 mm, 0.4-0.6 mm, elliptical	2.5-4 mm, ca. 1 mm, elliptical	ca. 2 mm, ca. 0.3 mm, elliptical	2-2.5 mm, ca. 0.4 mm, elliptical	2-2.7 mm, ca. 0.3 mm, broadly elliptical	ca. 1.5 mm, ca. 0.3 mm, elliptical	ca. 1 mm, presumably short < 1/2 length of grain	ca. 1.5 mm, ca. 0.2 mm, elliptical to punctiform	ca. 1.8 mm, ca. 0.25 mm, narrowly elliptical	1-4 mm, 0.2- 0.4 mm, punctiform to elliptical
Lipid presence, caryopsis firmness	present, firm	present, firm	present, firm	present, firm	present, firm	present, firm	N/K	N/K	present, firm	present, firm	present, firm
Styles, stigma	bases with a gap, plumose	bases with a gap, plumose	bases with a gap, plumose	bases with a gap, plumose	bases without a gap between them, slender with only short primary branches	bases with a gap, plumose	bases with a gap, plumose	bases with a gap, plumose	bases with a gap, plumose	bases with a gap, plumose	bases with a gap, plumose
Chromosomes	2n = 42, 91, 97	2n = 28, 42, 62	2n = 28	N/K	N/K	2n = 28	N/K	2n = 28	2n = 56	N/K	x = 7

VB = vascular bundles. N/K = not known.

The single species of *Austrofestuca* s. str. is now treated as *Poa billardierei* St.-Yves ($\equiv$ *A. littoralis* (Labill.) E. B. Alexeev) (subg. *Poa* sect. *Austrofestuca* (Tzvelev) Soreng & L. J. Gillespie) based on DNA sequence evidence (Hunter et al., 2004; Gillespie & Soreng, 2005; Gillespie et al., 2007). *Austrofestuca* leaf blades are similar to *P. macrantha* (subg. *Poa* sect. *Madropoa* Soreng) in involution and vestiture (Fig. 3G, H), and both are coastal sand-dune species. Blades of both species have involute margins and are densely covered by prickly hairs ca. 100 μ m long, as is typical of *Poa* sect. *Madropoa* and many Australian species of *Poa*. In *P. billardierei*, the leaf blades have only two distinct grooves on the adaxial surface, as is typical of *Poa*, whereas *P. macrantha* can have up to three lateral grooves on each side of the midrib, with low costal ribs up to 2.5 $\times$ the width of the valleys (a condition not previously reported in any other species of *Poa*). *Poa* sect. *Austrofestuca* is perfect-flowered, however, whereas *Poa* sect. *Madropoa* species are diclinous, often dioecious as in *P. macrantha*.

Little has been published about the single species of *Tzvelevia* (Alexeev, 1985), an endemic of the Kerguelen Islands and Heard Island. The genus was not mentioned by Clayton and Renvoize (1986) or Watson and Dallwitz (1992). The combination of *Poa*-type leaf blade adaxial anatomy (Fig. 2D), keeled, unawned, softly pubescent lemmas, glabrous calluses, and acute, entire ligule margins supports its relationship with *Poa* rather than *Nicoraepoa*. *Tzvelevia* does not have papillae in the adaxial or abaxial leaf blade epidermis but does have sparse short hooks adaxially. Scant sclerenchyma is developed between the vascular bundles and the epidermis, and it appears to be discontinuous, not forming girders. For these reasons, we submerge *Tzvelevia* in *Poa* as a section (see Taxonomic Treatment section).

The four species of alpine southeastern Europe and the Middle East in the genus *Bellardiochloa* (type, *B. violaceae* (Bellardi) Chiov. (= *B. variegata* (Lam.) Kerguelen)) have been placed in (Clayton & Renvoize, 1986) and out of *Poa*, sometimes near *Poa* (Edmondson, 1980), or in a subtribe with *Festuca* rather than with *Poa* (Tzvelev, 1983; Mill, 1985). Molecular analyses have consistently shown that *B. variegata* does not belong within *Poa* (Soreng et al., 1990; Davis et al., 1993; Soreng et al., 2007; Gillespie et al., 2007). It differs from *Poa* in leaf blade anatomy, with multiple tall costal ridges and deep valleys (Fig. 2A; Hernández Cardona, 1978; García-González, 1983), slender leaf blade apices, weakly keeled lemmas with awns, calluses with a crown of hairs, ciliate lodicule margins, sometimes semi-soft endosperm, and a crown of hairs at rachilla joint apices. With *Nicoraepoa*, the genus *Bellardiochloa* shares the deeply corrugated

leaf blade adaxial epidermis and short-awned lemmas, but differs in the narrow costal ridges, weakly keeled lemmas, ciliate lodicule margins, and a crown of hairs at rachilla joint apices.

AN EXPANDED SUB-ANTARCTIC *POA* SECT. *PARODIOCHLOA*

Analyses of cpDNA and ITS data place *Parodiochloa flabellata* within *Poa*, above the basal split of the remainder of *Poa* from section *Sylvestres* V. L. Marsh ex Soreng (and, in cpDNA analyses, subgenus *Arctopoa* (Griseb.) Prob.). The species is placed within the subgenus *Ochlopoa* (Asch. & Graebn.) Hyl. clade in cpDNA analyses, and between the subgenus *Ochlopoa* clade and the large higher *Poa* clade including subgenera *Poa*, *Pseudopoa* (K. Koch) Stapf, and *Stenopoa* (Dumort.) Soreng & L. J. Gillespie in ITS analyses (Gillespie & Soreng, 2005; Gillespie et al., 2007; Gillespie et al., in prep.). The single species of *Parodiochloa* was elevated within *Poa* to *Poa* sect. *Parodiochloa* (Gillespie & Soreng, 2005). This species is morphologically unusual in *Poa* and differs from all other *Poa* species (Hubbard, 1981) in having the styles terminal with no gap between them at the base, and stigmas that are elongated and simple with only short primary branches. In all other *Poa* species (Tzvelev, 1983; Watson & Dallwitz, 1992; Soreng, pers. obs.), the styles have a distinct gap between them at the base, and the stigmas are plumose with secondary branching. The species also differs from all *Poa* species in having apical cusps grading to short, stout apical awns. *Parodiochloa* differs from *Nicoraepoa* in its caespitose habit, elongated, deeply lacerate, glabrous ligules, and asymmetrically curved florets (Fig. 5S). Its adaxial leaf blade anatomy (Fig. 2E, F) is intermediate between that of *Poa* and *Nicoraepoa* in the ridge and valley adaxial epidermal topography, but the intercostal zones are covered by globose papillae, a condition unknown in *Poa* (except in five other sub-Antarctic island species; see next paragraph) and absent in *Nicoraepoa*. A few other species of *Poa* (e.g., *P. arida* Vasey and *P. keckii* Soreng) sometimes have single acentrically positioned papillae on some long cells of the abaxial leaf blade surfaces (Soreng, pers. obs.), a feature characteristic of *Puccinellia* Parl. and other genera of subtribe Puccinelliinae Soreng & J. I. Davis (Soreng et al., 2003b).

Five sub-Antarctic island species of *Poa* approach *Nicoraepoa* and *P. flabellata* in leaf blade anatomy and other characters. Edgar (1986), in a revision of New Zealand *Poa*, considered *P. cookii* and *P. ramosissima* Hook. f. to be a natural group that is likely allied to *P. flabellata*. *Poa flabellata* grows on oceanic islands adjacent to South America, *P. cookii*

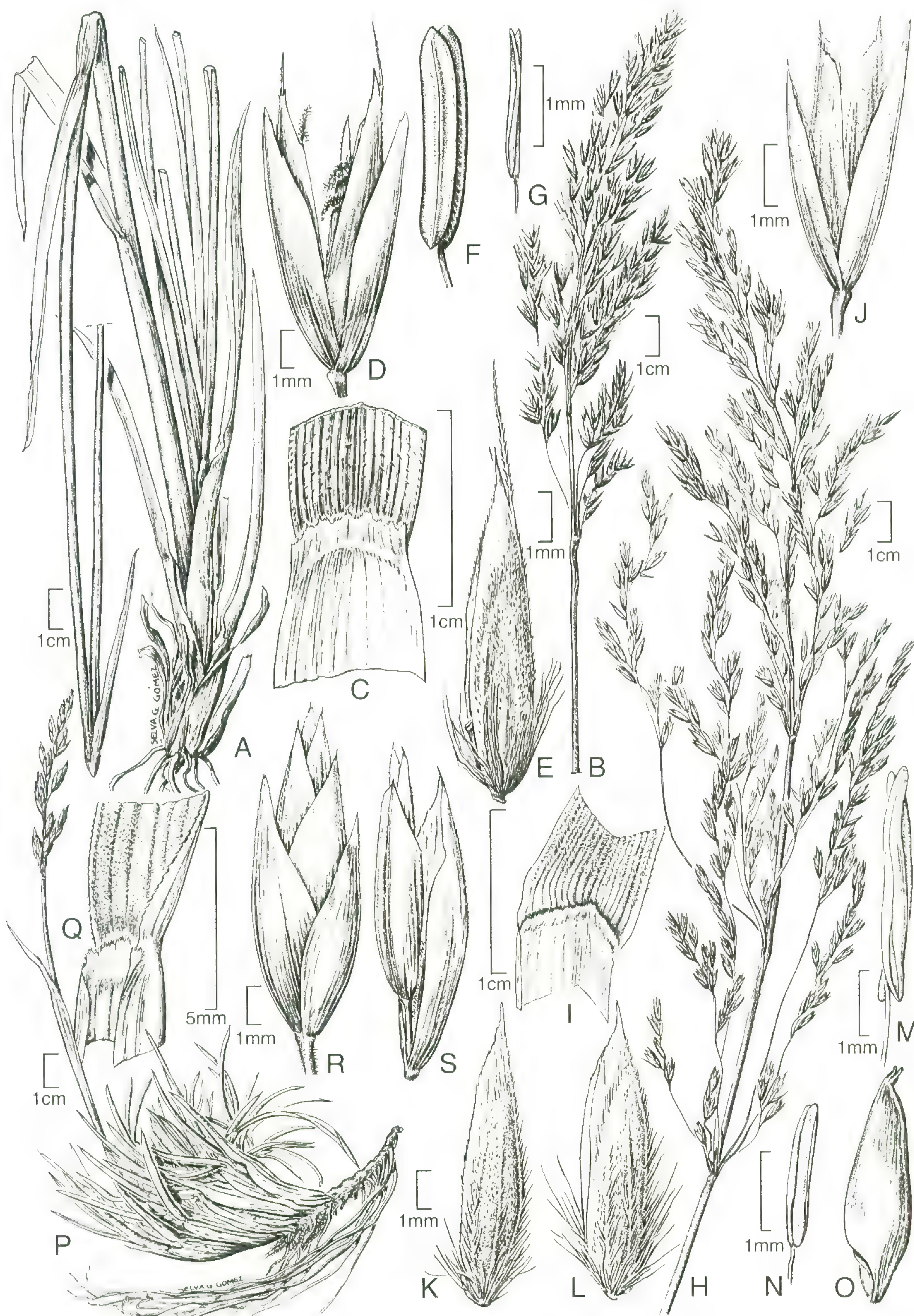


Figure 4. A–G. *Nicoraepoa andina* (Trin.) Soreng & L. J. Gillespie. —A. Habit. —B. Inflorescence. —C. Ligule. —D. Spikelet. —E. Floret. —F. Anther (fertile). —G. Anther (sterile). (Drawn by S. G. Gómez. Reprinted from *Flora Patagónica* vol. 8(3): fig. 109, with permission from INTA.) H–O. *Nicoraepoa chonotica* (Phil.) Soreng & L. J. Gillespie. —H. Inflorescence. —I. Ligule. —J. Spikelet (perfect). —K. Floret (perfect). —L. Floret (pistillate). —M. Anther (fertile). —N. Anther (sterile) —O. Caryopsis. (Drawn by S. G. Gómez. Reprinted from *Flora Patagónica* vol. 8(3): fig. 113, with permission

on islands in the southern Indian Ocean, and *P. ramosissima* on islands south of New Zealand's South Island. *Poa cookii* shares many characteristics of *P. flabellata*. A close relationship between *P. flabellata* and *P. ramosissima* has now been demonstrated based on ITS sequence analyses (Gillespie et al., in prep.). Three additional New Zealand sub-Antarctic island species are considered closely related to *P. ramosissima* and *P. cookii*: *P. hamiltonii*, *P. foliosa*, and *P. tennantiana*. Edgar (1986) grouped the latter two species and treated *P. hamiltonii* as a synonym of *P. cookii*. We tentatively consider *P. hamiltonii* distinct from *P. cookii*, but agree there are few differences (see *Notes* in Taxonomic Treatment section under *P. hamiltonii*). This set of morphologically similar, southern-ocean island species has neither been united in an infrageneric classification nor formally grouped with *P. flabellata*. These five species are here placed in *Poa* sect. *Parodiochloa* with *P. flabellata*. Molecular relationships of the latter four species remain to be studied.

Several morphological features distinguish this newly expanded *Poa* sect. *Parodiochloa* (Table 2). The species are mostly large tufted grasses (except *P. ramosissima*), sometimes rhizomatous (*P. foliosa*, *P. tennantiana*), sometimes with pungent (*P. flabellata*) or semi-pungent leaf blades (*P. cookii*, *P. foliosa*, *P. hamiltonii*). Adaxial leaf blade surfaces are densely papillate on the costal or intercostal regions or both (all species, Figs. 2E, F, 3A–C; also noted by Edgar & Connor, 2000) (sometimes absent in *P. tennantiana*, Fig. 3D), and are otherwise mostly smooth (*P. ramosissima*, *P. tennantiana*) or quite scabrous (*P. cookii*, *P. flabellata*, *P. foliosa*, *P. hamiltonii*). The five to 42 lateral costal ridges (occasionally obscured by intercostal papillae) are tall (*P. cookii*) or have moderate or low adaxial epidermal relief in other species, and are one to three times wider than the intercostal valleys. The ligules are deeply and regularly lacerate (*P. cookii*, *P. hamiltonii*, *P. ramosissima*), elongate and entire to irregularly lacerate at the apex (*P. flabellata*), or short, truncate, and densely covered with short thick appressed hairs (*P. foliosa*, *P. tennantiana*). Panicle branches are mostly smooth but can be scabrid to hispid (some *P. cookii*). Lemma apices are generally slightly twisted and sharply pointed, with a short, somewhat thick attenuated cusp (*P. cookii*, *P. foliosa*, *P. hamiltonii*, *P. ramosissima*, *P. tennantiana*) grading to an awn up to 3 mm long in *P. flabellata*. The species are gynomonoecious (*P. cookii*, *P.*

hamiltonii, *P. ramosissima*), dioecious (*P. foliosa*), or perfect-flowered (*P. tennantiana*) (Edgar, 1986; Edgar & Connor, 2000). Although *P. flabellata* was reported to be perfect-flowered (Anton & Connor, 1995), this needs further study. The stigmas are plumose and the styles are distinctly separate at the base, as is typical of Poeae, or the stigmas are slender and short-branched and the styles have no gap between them at the base (*P. flabellata*). The floret calluses may be glabrous (four species) or distinctly webbed (*P. foliosa* and most *P. ramosissima*). The glabrous state for calluses appears to be derived in this group, and thus the presence of a dorsal web is still an autapomorphy of *Poa*.

KEY TO THE GENUS *NICORAEPOA* AND SELECTED GENERA AND SPECIES OF SUBTRIBE POINAE

Genera of Poeae subtribe Poinae included in the key are: *Arctophila*, *Bellardiochloa*, *Dupontia*, *Festucella*, *Hookerchloa*, *Hyalopoa* (Tzvelev) Tzvelev, *Nicoraepoa*, and *Poa* (including sections *Austrofestuca*, *Madropoa*, p.p., *Parodiochloa*, *Siphonocoleus* Hitchc., and *Tzvelevia*). These genera share a perennial habit, multiple-flowered spikelets that are lanceolate in shape, and acute to acuminate glumes reaching over three fourths the length of the adjacent florets. Their caryopses have a non-linear, short hilum up to one third the length of the grain and are apically glabrous. The Poinae genus *Arctagrostis* is not included because it can be easily distinguished by its single-flowered spikelets. Likewise, genera of Alopecurinae and Miliinae may be distinguished by single-flowered spikelets. Genera of subtribe Puccinelliinae (Soreng et al., 2003b) similar to *Poa* in gross or overall morphology are excluded by their generally shorter glumes in combination with papillate leaf surfaces or single-flowered spikelets (*Catabrosa* P. Beauv., *Catabrosella* (Tzvelev) Tzvelev, *Oreopoa* H. Scholz & Parolly, *Paracolpodium* (Tzvelev) Tzvelev, *Phippsia* (Trin.) R. Br., *Pseudosclerochloa* Tzvelev, *Puccinellia*, *Sclerochloa* P. Beauv.).

Various combinations of characters can be used to discriminate among the above set of Poinae genera, but none holds up for all species. Thus, producing a key to the genera could be approached in a variety of ways depending on which characters are employed in which order. Leaf characteristics, including adaxial leaf blade surface morphology and ligule shape, seem to be the most consistently diagnostic for *Nicoraepoa*.

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from INTA.) P–S. *Nicoraepoa pugionifolia* (Speg.) Soreng & L. J. Gillespie. —P. Habit. —Q. Ligule. —R. Spikelet. —S. Floret. (Drawn by S. G. Gómez. Reprinted from *Flora Patagónica* vol. 8(3): fig. 112, with permission from INTA.)



Figure 5. A–D. *Nicoraepoa erinacea* (Speg.) Soreng & L. J. Gillespie. —A. Habit. —B. Ligule. —C. Spikelet. —D. Floret. (Drawn by I. Coloiera. Reprinted from *Flora Patagónica* vol. 8(3): fig. 110, with permission from INTA.) E–I. *Nicoraepoa robusta* (Steud.) Soreng & L. J. Gillespie. E. Habit. —F. Ligule. G. Spikelet. —H. Floret. —I. Palea. (Drawn by I. Coloiera. Reprinted from *Flora Patagónica* vol. 8(3): fig. 108, with permission from INTA.) J–N. *Nicoraepoa subenervis* (Hack.) Soreng & L. J. Gillespie subsp. *subenervis*. —J. Habit. —K. Ligule. —L. Spikelet. —M. Floret. —N. Palea. (Drawn by

1a.	Adaxial leaf blade lateral surfaces prominently corrugated with multiple ridges and valleys, the ridges 2–5× wider than the valleys, without papillae; ligules 0.2–3 mm long, apices truncate (to slightly higher at the margins), margins entire or irregularly erose, never lacerate, ciliate or ciliate (cilia 0.1–0.6 mm long); calluses glabrous or with a crown of straight to slightly curved hairs to 0.2–3 mm long, never webbed; plants usually of wet or seasonally wet, sometimes saline or subsaline habitats in southern South America	<i>Nicoraepoa</i>
1b.	Adaxial leaf blade lateral surfaces flat or nearly flat or, if weakly to prominently corrugated with multiple ridges and valleys and the ridges up to 1–5× wider than the valleys, then the adaxial surface papillate in part (except some <i>Poa tennantiana</i>) and ligules commonly longer than 3 mm and sometimes deeply lacerate; ligules 0.2–25 mm long, apices truncate to acuminate, margins entire to deeply and regularly lacerate, smooth or infrequently asperous or ciliate (cilia to 0.1 mm long); calluses glabrous or with a crown or dorsal tuft of hairs (webbed); plants of various habitats, not from South America (except <i>Nicoraepoa erinacea</i> and some <i>Poa</i>)	2
2a.	Ligules deeply and more or less regularly lacerate	3
3a.	Calluses with a crown of hairs 0.3–0.7 mm long; lemmas 3-nerved; adaxial leaf blade surfaces not papillate; plants of Northern Hemisphere high-latitude wetlands	<i>Arctophila</i>
3b.	Calluses glabrous or webbed, infrequently with a few isolated hairs around the sides of the callus; lemmas 3- to 5-nerved	4
4a.	Culms and nodes strongly compressed; sheaths fused to near their collars; adaxial leaf blade surfaces not papillate; plants of uplands in the Hawaiian Islands	<i>Poa</i> sect. <i>Siphonocoleus</i> (<i>P. mannii</i> Munro, <i>P. sandvicensis</i> (Reichardt) Hitchc., and <i>P. siphonoglossa</i> Hack.)
4b.	Culms and nodes terete; sheaths fused only in the lower 1/2; adaxial leaf blade surfaces densely papillate; plants of sub-Antarctic island coastal regions (<i>Poa</i> sect. <i>Parodiochloa</i> , p.p.)	5
5a.	Culms slender, the vegetative portions prostrate, clambering on rocks; plants stooling, forming mats; leaf blades lax, soft, 1–2 mm wide, flat, abaxially and adaxially papillate; lemmas papillate	<i>Poa ramosissima</i>
5b.	Culms stout, spreading to erect; plants caespitose, forming large dense tufts; leaf blades moderately firm, 2–10 mm wide, flat or folded, abaxially smooth, adaxially papillate in part; lemmas not papillate	6
6a.	Fibrous ridges of basal sheaths smooth or irregularly sparsely scabrous; leaf blades adaxially nearly smooth or with scattered thick-based low hooks over the veins	<i>Poa hamiltonii</i>
6b.	Fibrous ridges of basal sheaths regularly and closely pectinately scabrous (as in a sawfish’s bill); leaf blades adaxially papillate and sometimes scabrous on the sides of the ridges with narrow-based spreading tipped hooks	<i>Poa cookii</i>
2b.	Ligules entire or infrequently with few irregular, mostly shallow lacerations	7
7a.	Adaxial leaf blade surfaces regularly corrugated with ridges 1–3× as wide as adjacent intercostal valleys	8
8a.	Lemmas rounded to weakly keeled across the back, apex usually slender short-awned; leaf blades slender, 0.2–0.7(–1) mm wide, tightly involute; calluses with a crown of hairs often persisting at the tips of rachilla joints; panicle branches densely scabrous angled; caryopses semi-soft; alpine plants of southern Europe and the Middle East	<i>Bellardiochloa</i>
8b.	Lemmas keeled across the back, apex cuspidate to stiffly short-awned; leaf blades broader, 2–10 mm wide, flat or folded, or the outer margins inrolled; calluses glabrous or webbed; panicle branches smooth or finely scabrous angled; caryopses firm; plants of sub-Antarctic islands and coasts of Tierra del Fuego, South America, and Shetland Islands (<i>Poa</i> sect. <i>Parodiochloa</i> , p.p.)	9
9a.	Panicles tightly contracted; lemmas and calluses glabrous; ligules 6–23 mm long, abaxially smooth or sparsely scabrous	<i>Poa flabellata</i>
9b.	Panicles contracted to loosely contracted; lemmas pubescent at least basally, calluses glabrous or webbed; ligules 1–16 mm long, abaxially densely scabrid to puberulent	10
10a.	Ligules 1–3 mm; fibrous ridges of basal sheaths smooth; calluses webbed; panicles contracted	<i>Poa foliosa</i>
10b.	Ligules 6–16 mm; fibrous ridges of basal sheaths scabrous; calluses glabrous; panicles loosely contracted	<i>Poa tennantiana</i>
7b.	Adaxial leaf blade surfaces generally with only two central grooves, or with low ridges not more than 1× as wide as adjacent shallow valleys	11
11a.	Calluses glabrous or with an isolated dorsal tuft of hairs; lemmas unawned	<i>Poa</i> (most species including section <i>Tzvelevia</i>)
11b.	Calluses with a crown or beard of hairs around the base; lemmas awned or not	12
12a.	Lemmas with a terminal or slightly subterminal awn; plants with coarsely fibrous old basal sheaths; panicles open, branches scabrous-angled; calluses with a crown or beard of short hairs to 1 mm long	13
13a.	Leaf blades flat or folded, 2–7 mm wide, surfaces smooth or nearly so, margins scabrous	<i>Hookerochloa</i>

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I. Coloiera. Reprinted from *Flora Patagónica* vol. 8(3): fig. 107, with permission from INTA.) O S. *Poa flabellata* (Lam.) Raspail. —O. Habit. —P. Inflorescence. —Q. Ligule. —R. Spikelet. —S. Florets. (Drawn by F. Torres. Reprinted from *Flora Patagónica* vol. 8(3): fig. 88, with permission from INTA.)

- 13b. Leaf blades involute, 0.5–1.5 mm wide, surfaces and margins scabrous *Festucella*
- 12b. Lemmas unawned; plants with or without fibrous old basal sheaths; panicles contracted or open, branches smooth or scabrous (rarely hispidulous), terete or angled; calluses with a crown or beard of short or longer hairs to 5 mm long 14
- 14a. Ligules short-truncate, to 1 mm long, margins ciliolate to ciliate; callus with a dense crown or beard of short hairs to 1 mm long; leaf blades ca. 1–2 mm wide, tightly folded with involute margins, firm to moderately firm, adaxially densely scabrid to coarsely hispidulous or soft-pubescent on and between the veins, abaxially smooth, glabrous; panicles contracted, dense or with few spikelets; stoloniferous to rhizomatous plants . . . 15
- 15a. Panicles simple, sub-spicate, with fewer than 8 spikelets; plants forming low dense cushions to 25 cm tall; leaf blades up to 3(4) cm long, abaxially softly puberulent, stiff and sharply pungent; plants of interior sub-saline seasonally wet habitat in Patagonia, Argentina *Nicoraepoa erinacea*
- 15b. Panicles branched, densely contracted, with more than 10 spikelets; plants dense to widely spreading, usually forming larger tufts, 20–100 cm tall; some or many leaf blades over 5 cm long, abaxially coarsely scabrous to stiffly puberulent, stiff and sharply pungent to moderately firm and weakly pungent; plants of coastal sands . . . 16
- 16a. Leaf blades firm, sharply pungent; flowers perfect; plants of Australia and New Zealand *Poa billardierei* (sect. *Austrofestuca*)
- 16b. Leaf blades moderately firm, weakly pungent; flowers unisexual; plants of the Pacific coast of United States and Canada
. *Poa* sect. *Madropoa*, p.p., *P. douglasii* Nees, and *P. macrantha*
- 14b. Ligules obtuse to acuminate, 1–18 mm long, margins glabrous; callus glabrous or with a short or longer crown of hairs to 5 mm long; leaf blades to 1.5–10 mm wide, flat, folded or involute, soft, adaxially smooth or scabrous mainly over the veins, abaxially smooth or scabrous, glabrous or infrequently stiffly puberulent; panicles contracted or open; plants of various habits 17
- 17a. Palea keels scabrid at least in part; panicle branches smooth or scabrous . . . *Poa*, p.p.
- 17b. Palea keels smooth or nearly so; panicle branches smooth 18
- 18a. Lemmas distinctly keeled; callus with a diffuse crown of fine soft weakly woolly hairs 1–2.5 mm long *Hyalopoa*
- 18b. Lemmas weakly keeled; callus with a tuft of straight or sinuous hairs on the surrounding lemma base 19
- 19a. Leaf blade abaxial surface strongly ribbed, flat; glumes usually much shorter than adjacent florets; paleae subequal to lemmas; florets 2 to 6; lemmas glabrous, apices obtuse *Arctophila*
- 19b. Leaf blade abaxial surface smooth or weakly ribbed, flat or weakly involute; glumes subequal or longer than adjacent florets; florets 1 to 2; paleae distinctly shorter than lemmas; lemmas glabrous or softly pubescent, apices acute to acuminate *Dupontia*

TAXONOMIC TREATMENT

Nicoraepoa Soreng & L. J. Gillespie, gen. et nom. et stat. nov. Replaced name: *Poa* subgen. *Andinae* Nicora, Hickenia 1(18): 99. 1977. TYPE: *Nicoraepoa andina* (Trin.) Soreng & L. J. Gillespie.

Perennials; gynodioecious to weakly dioecious, or syncious; stoutly rhizomatous, rhizomes 1–3 mm diam., short or long; major roots 1–2 mm diam.; vegetative branching intra- and extra-vaginal; sheaths of basal leaves becoming coarsely fibrous in age, smooth or sparsely scabrous between veins; sheaths of upper culm leaves open to near base or margins joined by a narrow hyaline membrane up to 1/4 the sheath in length; ligules 0.2–3 mm long, thickly membranous to chartaceous, abaxially smooth or pubescent with appressed to loose hairs, apices truncate or longest near the margins, irregularly erose ciliolate to ciliate (with hairs to 0.5 mm long); blades firm (fairly soft in *N. subenervis*), flat, folded or involute, 2–15 mm wide,

abaxially smooth or the keel scabrid near apices, glabrous, adaxially with (2)4 to 48 deep to moderately deep intercostal valleys that are smooth or more often scabrous, separated with blocky flat-topped or broadly rounded costal ridges (anatomically with adaxial epidermis underlain by sclerenchyma caps or with “T”- or “I”-shaped girders extending to the abaxial epidermis in cross section), 1–5× broader than the valleys, without papillae, smooth or commonly scabrous especially on the sides of the ridges, glabrous or rarely short stiff puberulent (*N. erinacea*), apices pungent (weakly so in *N. subenervis*). Panicle axis and branches smooth or less often scabrous, pedicels smooth or scabrous, glabrous (or rarely coarsely hispidulous). Spikelets 2- to 5-flowered; rachilla internodes terete, usually scabrous; glumes subequal, smooth or keels scabrous, chartaceous throughout or apically scarious, 1- or 3-veined, lateral veins faint or distinct, subequal to the adjacent lemmas; calluses blunt, glabrous or with a crown of 0.2–3 mm long, straight or slightly curved hairs;

lemmas keeled, apices symmetrical and not twisted, acutely pointed, mucronate, or awned from a sinus up to 0.2 mm deep, glabrous or with stiff hairs on the keel to 1 mm long and sometimes on the marginal veins at the base, smooth throughout or scabrous over much of the surface, weakly veined, awnless or with a slender, erect, briefly divergent or weakly sinuous, slender, scabrid, 0.2–3(5) mm long awn from the keel vein (without lateral merging veins); palea keels scabrous or coarsely ciliate; lodicules 2, 1–2 mm long, membranous, lanceolate, apically entire or irregularly short-toothed; anthers 3, 2–3 mm long, staminodes in pistillate flowers 1–3 mm long. Caryopsis glabrous, firm or less often semi-soft, lipid present; hilum round to narrowly elliptical, 1/5–1/3 the grain in length; style bases terminal, with a gap between them, stigmas plumose, white.

Distribution and habitat. Argentina and Chile, from moderately high elevations in the Andes at about 32°S in the province of San Juan, Argentina, and Region V, Chile, south through Patagonia to coastal and interior regions of Tierra del Fuego, Isla de Estados, and Falkland/Malvinas Islands (Nicora, 1978; Moore, 1983). Perennially or seasonally wet ground, or in shallow water, in fresh water or frequently in subsaline, saline, or mineralized soils of coastal sands and estuaries, springs, bogs, marshes, springy meadows, wet rocks, and riparian meadows, from sea level to over 3200 m.

Notes. The new genus name commemorates the late Elisa G. Nicora, Argentine specialist in *Poa*, author of *Poa* subg. *Andinae*, and influential, longtime student of South American Poaceae who passed away in 2001 (Rúgolo de Agrasar, 2001). The subgenus epithet *Andinae* is a plural adjective and cannot be satisfactorily employed as a plural Latinized noun. Also, there is a genus *Andinia* (Luer) Luer in Orchidaceae. *Nicoraepoa* has six species and two subspecies. A good key to the species is available in Nicora (1978).

1. *Nicoraepoa andina* (Trin.) Soreng & L. J. Gillespie, comb. nov. Basionym: *Poa andina* Trin., Linnaea 10(3): 306. 1836. TYPE: Chile. [Region Bío-Bío, province Bío-Bío]: “austr. in alp. frigid. mont. igniv. Antuco,” [1829], *E. Pöppig* [D.-907] (holotype, LE [TRIN-2578.01a]!; isotypes, LE [TRIN-2578.01a] fragment at BAA-2450b!, LE!). Figure 4A–G.

Poa acrochaeta Hack., Repert. Spec. Nov. Regni Veg. 10(243–247): 172. 1911. TYPE: Chile. [Region Maule, province Curicó]: Vulkan Peteroa, s.d., *comm. K. F. Reiche* s.n. [collector questionable: 448 in Philippi script on label (possibly *M. Vidal Gormaz* in 1891 according to E. Nicora annotation)] (holotype, SGO

[PHIL-448] W 39455!; isotypes, SGO [PHIL-448] fragment and photo at US 1723707!, W 39455 fragment at US 88711!).

Poa aristata Phil., Anales Univ. Chile 43: 574. 1873. TYPE: Chile. [Region Los Lagos, province Osorno]: Volcán de Osorno, [1872], *don Carlos Juliet* s.n. (holotype, SGO [PHIL-439] W 39450!; isotypes, BAA-2457!, SGO [PHIL-439] fragment and photo at US 89700!).

Deschampsia latifolia Phil., Linnaea 29(1): 91. 1858, non *Deschampsia latifolia* Hochst. ex A. Rich., 1850. TYPE: Chile. [Region Maule, province Linares]: in Andibus dep. [Cordillera] Linares, *Germain* s.n. (holotype, SGO [PHIL-197] W not seen; isotypes, SGO 63483!, SGO [PHIL-197] fragment and photo at US 556494!).

Distribution and habitat. Argentina (Neuquén), Chile (Araucanía, Bío-Bío, Los Lagos, Maule), in the central Patagonian Andes (Nicora, 1978). Stream banks and wet meadow at high elevations.

Notes. Many SGO Philippi types of Poaceae were loaned to US ca. 1904 (where fragments were retained and specimens photographed; see U.S. National Herbarium Type Specimen Register, <<http://ravenel.si.edu/botany/types/>>), returned to SGO, and then sent to Edward Hackel in Vienna, where they may be seen today, generally with W accession numbers on the SGO sheets.

Additional specimen examined. CHILE. **Araucanía:** Laguna Captrén, R. J. & N. L. Soreng 7193 (CONC, US).

2. *Nicoraepoa chonotica* (Phil.) Soreng & L. J. Gillespie, comb. nov. Basionym: *Poa chonotica* Phil., Linnaea 29(1): 97. 1858. TYPE: Chile. [Region Aysén, province Aysén]: [Chonos-Islands], “in monte Cerro de Chonos ad circa 1290 ped. s.m.,” *Dr. Fonk* s.n. (holotype, SGO [PHIL-410] W s.n.!, isotypes, SGO [PHIL-410] fragment at BAA!, SGO [PHIL-410] fragment and photo at US 89683!). Figure 4H–O.

Poa berningeri Pilg., Notizbl. Bot. Gart. Berlin-Dahlem 10(97): 761. 1929. TYPE: Chile. [Region Los Lagos, province Llanquihue: Volcán Yates, ca. 1200 m, “vereinzelt zwischen *Nothofagus* an der Waldgrenze,” Mar. 1925, *Werdermann* 1698 (holotype, B not seen; isotypes, B fragment at BAA!, B fragment at US 89693! [pistillate]).

Poa borchersii Phil., Anales Univ. Chile 94: 172. 1896. TYPE: Chile. [Region Bío-Bío, province Ñuble]: “prope thermas chillanenses,” [Baños de Chillan, Jan. 1883], *Augustus Borchers* s.n. (holotype, SGO [PHIL-431] W 39457!; isotypes, US fragment at BAA!, SGO [PHIL-431] fragment and photo US 89691a!, W 29457 fragment at US 89691b!).

Poa chubutensis Speg., Anales Mus. Nac. Hist. Nat. Buenos Aires 7: 196. 1902. TYPE. Argentina. Province Chubut: [region Río Corcovado, 43°S, 71°W], “in rupestribus collinis prope Teka-choique, [1–15 Feb.] aest. 1901,” *N. Illin* [90] (holotype, LP!; isotypes, BAA 2518!, SI!, US 916986!, LP [SPEG] US 1503958!).

Poa latifolia Phil., Linnaea 29(1): 97. 1858, non *Poa latifolia* G. Forst., Fl. Ins. Austr. 4, no. 44. 1786. TYPE: Chile.

[Region Aysén, province Aysén]: [Chonos-Islands], “in monte Cerro de Chonos ad circa 1290 ped. s.m.,” *Dr. Fonk s.n.* (holotype, SGO [PHIL-414] W 39453!; isotypes, SGO fragment at BAA-2613!, SGO fragment at BAA-2612!, SGO 63493!, SGO [PHIL-414] fragment and photo at US 88768!).

Poa robusta Phil., *Anales Univ. Chile* 43: 574. 1873. non *Poa robusta* Steud., 1854. TYPE: Chile. [Region Los Lagos, province Llanquihue]: Volcán de Calbuco, [1872], *Carlos Juliet s.n.* (holotype, SGO [PHIL-443] W 39419!; isotype, SGO [PHIL-443] fragment and photo at US 88733!).

Distribution and habitat. Argentina (Chubut, Neuquén, Río Negro), Chile (Araucanía, Aysén, Los Lagos, Magallanes), in central and southern Patagonian Andes and coastal reaches of southwestern Chile. Low to upland marshes, riverbanks, and wet rocks.

Notes. This species was called *Poa borchersii* (Nicora, 1978), but Soreng et al. (2003a) determined that the older name *P. chonotica* applies to the species. Viviparous specimens of this species are common but can be separated from *Nicoraepoa robusta* by their looser or open panicles, shorter glumes, and frequent presence of a few hairs around the callus.

Additional specimens examined. CHILE. **Araucanía:** Lonquimay, A. Pfister 7949 (CONC). **Aysén:** Seno Ventisquero, R. J. & N. L. Soreng 7254 (CONC, US). **Magallanes:** Última Esperanza, Río Pingo, R. J. & N. L. Soreng 7349 (CONC, US).

3. *Nicoraepoa erinacea* (Speg.) Soreng & L. J. Gillespie, comb. nov. Basionym: *Poa erinacea* Speg., *Anales Mus. Nac. Hist. Nat. Buenos Aires* 7: 198. 1902. TYPE: Argentina. [Province Chubut]: “in aridissimis subsalsis secus Río Chubut,” Dec. 1899, *N. Illin s.n.* (holotype, LP 67!; isotypes, LP BAA 2534!, LP fragment at US 88783!). Figure 5A–D.

Distribution and habitat. Argentina (Chubut), in arid parts of Patagonia (Nicora, 1978). Subsaline springs, at mid-elevations.

Notes. This is one of the odder species of the new genus, as the leaf blades are narrow and softly hairy, with few intercostal valleys on the adaxial surface. However, as in other *Nicoraepoa* species, the callus has a distinct crown of hairs, the short stiff leaf blades are apically pungent, and the ligules are densely ciliate.

4. *Nicoraepoa pugionifolia* (Speg.) Soreng & L. J. Gillespie, comb. nov. Basionym: *Poa pugionifolia* Speg., *Anales Mus. Nac. Hist. Nat. Buenos Aires* 7: 199. 1902. TYPE: Argentina. [Province Santa Cruz]: “Párr-aik (Río Sehuen), Feb 1898,”

C. Ameghino s.n. (lectotype, designated here, LP [SPEG-65]!); isotype, [LP-SPEG-65 fragment] BAA-2672!. Figure 4P–S.

Poa acutissima Pilg., *Repert. Spec. Nov. Regni Veg.* 12: 306. 1913. TYPE: Argentina. Süd-Patagonien, [1907–1908], *C. Skottsberg s.n.* (holotype, B not seen; isotypes, BAA 2442!, BAA 2443!, B fragment at US 88712!).

Distribution and habitat. Argentina (Santa Cruz, Tierra del Fuego), Chile (Magallanes), in Patagonia. Low- to mid-elevation subsaline meadows and open ground in semi-arid Patagonia.

Notes. LP-SPEG-65 is unambiguous as a lectotype. The two original specimens in Speggazzini’s herbarium are taxonomically indistinguishable, but the place, river, and month recorded on the labels are arranged differently than in the original protologue. The protologue stated, “in rupestribus porphyricis Párr-aik secus Río Chico et Boron-aik secus Río Sehuen, Jan. et Feb. 1898, *C. Ameghino s.n.*” The protologue has the localities and rivers and dates switched, as on a map we located Párr-aik south of the Río Sehuen, which is well south of the Río Chico. This is in agreement with the chosen lectotype and its isotype BAA-2672, “Párr-aik (Río Sehuen),” which gives the date as February, “2-1898.” We have not been able to locate Boron-aik on a map, but the syntype at LP [SPEG-66] says Boron-aik (Río Chico), Jan. 1898.

Additional specimens examined. ARGENTINA. **Santa Cruz:** Güer Aike, 9 km S of Río Gallegos, *P. M. Peterson et al.* 17062 (SI, US); Buenos Aires, *P. M. Peterson et al.* 17254 (SI, US). CHILE. **Magallanes:** Última Esperanza, Sierra Baguales, R. J. & N. L. Soreng 7336 (CONC, US).

5. *Nicoraepoa robusta* (Steud.) Soreng & L. J. Gillespie, comb. nov. Basionym: *Poa robusta* Steud., *Syn. Pl. Glumac.* 1: 426. 1854. TYPE: Chile. [Region] Magallanes, [province Magallanes]: “Punta Arenas, paludibus salsis lit. maris prope, Dec.,” *W. Lechler [Hohenacker exsiccatæ]* 1191 (holotype, P [STEUD] not seen; isotypes, G fragment at BAA!, P fragment at BAA!, G not seen, LE!, K!, W, K, P fragments at US 81586!, LE fragment at US 946984!, W not seen). Figure 5E–I.

Festuca arenaria Lam., *Encycl.* 1: 191. 1791, non *Festuca arenaria* Osbeck, 1788. *Poa arenicola* St.-Yves, *Candollea* 3: 282. 1927, non *Poa arenaria* Lam., *Tabl. Encycl.* 1: 183. 1771. TYPE: [Chile. Region Magallanes, either province Magallanes or Tierra del Fuego]: E. Region of Magellan, in arenis maritimis, *M. Commerson s.n.* (holotype, P [LAM] not seen; isotypes, MPU not seen, P [LAM] fragment at US 2875377b!, MPU fragment and photo at US 2875377a! [perfect-flowered]).

Distribution and habitat. Argentina (Santa Cruz, Tierra del Fuego), Chile (Magallanes), in southern

Patagonia, Tierra del Fuego, Isla de los Estados, and Falkland/Malvinas Islands. Coastal wet meadows and beaches.

Notes. In this species there are normal-flowered and viviparous forms. The normal-flowered forms always have glabrous lemmas and calluses. In the viviparous forms, these structures may be glabrous, or, more commonly, there are some short sparse hairs on the callus. The latter plants are separable from *Nicoraepoa chonotica* viviparous plants by their narrowly lanceolate panicles and long glumes. Reports from farther north in Chile, Aysén Region, represent viviparous plants of *N. chonotica*.

6. *Nicoraepoa subenervis* (Hack.) Soreng & L. J. Gillespie, comb. nov. Basionym: *Poa subenervis* Hack., Ark. Bot. 7(2): 7, t. 2, f. 3. t. 7, f. 1908. TYPE: Argentina. [Province Santa Cruz]: Patagonia. “in paludosis inter, Lago Viedma et Laguna Tar, ca. 1000 m, 27 Feb. 1905,” *P. K. H. Dusén* 6021 (lectotype, designated here, W not seen; isotypes, K fragment at BAA 2704-1!, US fragment at BAA 2704-2!, W fragment at US 88723!).

Distribution and habitat. Argentina, Chile, in Patagonia. Upland vegas and subsaline springs in arid mountains.

Notes. The protologue reads: “Argentina. E. & S. Patagonia: ‘in montanis inter lacum Lago Viedma et lacum Laguna Tar ad marginem paludis in alt c 1000 m; ad flumen Río Fosiles in montanis uliginosis c 800 m,’ *Dusén*.” Three specimens agree with the type protologue: (1) “inter lacum Lago Viedma et lacum Laguna Tar,” *P. K. H. Dusén* 5927 (syntype, comm. J. F. Mullins in 1922 BAA 2703!); (2) “Lago San Martin, Río Fosiles in uliginosis c. 800 m, 1 ‘A.’ 1905,” *P. K. H. Dusén* (syntype, S not seen); and (3) *P. K. H. Dusén* 6021 (cited above as the lectotype). *P. K. H. Dusén* 6021 was selected as lectotype because duplicates and fragments are present in several herbaria.

6a. *Nicoraepoa subenervis* subsp. *subenervis*. Basionym: *Poa subenervis* Hack. var. *subenervis*.

Distribution and habitat. Argentina (Santa Cruz), Chile (Magallanes) (Nicora, 1978). Southern Patagonia. Figure 5J–N.

6b. *Nicoraepoa subenervis* subsp. *spgazziniana* (Nicora) Soreng & L. J. Gillespie, comb. nov. Basionym: *Poa subenervis* var. *spgazziniana* Nicora, Hickenia (18): 103. 1977. *Poa spgazziniana* Parodi, Dansk Bot. Ark. 22(1): 67. 1963. nom. nud. TYPE: Argentina. Province Mendoza: Dpto. San Rafael, Atuel Valle, a Arroyo Colorado

[lat. 34°, 2200 m, 19 Nov. 1955], *T. W. Böcher, Hjerting & K. Rahn* 1306 (holotype, BAA 2706-1!).

Distribution and habitat. Argentina (Mendoza, Neuquén [Nicora, 1978], and San Juan), Chile, (Libertador General Bernardo O’Higgins, Metropolitana), in the northern Patagonian Andes.

Additional specimens examined. ARGENTINA. **San Juan:** Río del Agua Negra, *P. M. Peterson et al.* 19296 (SI, US). CHILE. **Libertador General Bernardo O’Higgins:** Sewell, Río Coya, *Jiles s.n.* (CONC 134734). **Metropolitana:** above Embalse del Río Yeso, *R. J. & N. L. Soreng* 7155 (CONC, US).

SIX SUB-ANTARCTIC ISLAND *POA* SPECIES ARE PLACED IN *POA* SECT. *PARODIOCHLOA*

Poa* sect. *Parodiochloa (C. E. Hubb.) Soreng, Contr. U.S. Natl. Herb. 48: 579. 2003. Basionym: *Parodiochloa* C. E. Hubb., Bull. Brit. Mus. (Nat. Hist.), Bot. 8: 395. 1981, non *Parodiochloa* A. M. Molina, 1986. TYPE: *Festuca flabellata* Lam. ($\equiv$ *Poa flabellata* (Lam.) Hook. f.).

Notes. The section as here emended has six species.

1. *Poa cookii* (Hook. f.) Hook. f., Philos. Trans. 168: 22. 1879. Basionym: *Festuca cookii* Hook. f., Fl. Antarct. 2: 382, t. 139. 1846. TYPE: [France. Kerguelen Islands]: Kerguelen’s Land, Christmas Harbour, on rocks and in moist places always near the sea, abundant, May–Aug. 1840, *J. D. Hooker* 762 (lectotype, designated by Edgar, 1986, New Zealand J. Bot. 24: 433, K [H2003/00969-290!]; isotype, LE not seen).

Distribution and habitat. Sub-Antarctic islands of the southern Indian Ocean: Crozet Islands, Heard Island, Kerguelen Islands, Marion Island, and Prince Edward Islands (Edgar, 1986, without voucher citations). Edgar’s (1986) records for *Poa cookii* s.l. on Macquarie Island are referred to *P. hamiltonii*. Specimens reported by the Australian Antarctic Data Center (2007) from Crozet Islands (e.g., Possession Islands, *W. A. Proctor* 00257 [BM not seen]) and Heard Island (e.g., *J. M. R. Hughes & R. D. Seppelt* 24056 [ADT not seen]) are presumed to be *P. cookii* s. str. based on Edgar’s comments about differences in *P. cookii* s.l. plants from Macquarie Island from the rest of the species. Coastal wet rocks and bluffs, and wet slopes, to 100 m, often associated with penguin colonies. The Australian Antarctic Data Center (2007) reported *P. cookii* from Gough Island based on *E. W. Groves* collections, but these (and other specimens

seen by us) were verified by C. E. Hubbard (Groves, 1981) as *P. flabellata*. Two other specimens were cited in Hooker's original protologue: (1) Hab. Kerguelen's Land, *Anderson* (in Cook's Voyage) *s.n.* (syntype, not seen), and (2) Kerguelen's Land, *D. Lyall s.n.* (syntype, K [H2003/00969-289!]).

Additional specimens examined. SOUTH AFRICA. **Prince Edward Islands:** Marion Island, *S. Fugler* 125 (US); Prince Edward Island, *B. J. Huntly* 975 (K).

2. *Poa flabellata* (Lam.) Raspail, Ann. Sci. Observ. 2: 86, t. 4, f. 11. 1829. Basionym: *Festuca flabellata* Lam., Encycl. 2: 462. 1788. *Parodiochloa flabellata* (Lam.) C. E. Hubb., Bull. Brit. Mus. (Nat. Hist.), Bot. 8: 396. 1981. TYPE: [Chile. Region Magallanes, province Magallanes or Tierra del Fuego]; Cette plante a été trouvée au détroit de Magellan, [Dec. 1767–Jan 1768], *M. Commerson s.n.* (holotype, P [LAM] not seen; isotype, P [LAM] two fragments at US 2875414!). Figure 50–S.

Dactylis caespitosa G. Forst., Fasc. Pl. Magell. 12. 1788. *Festuca antarctica* Spreng., Pl. Min. Cogn. Pug. 2: 23. 1815. *Festuca caespitosa* (G. Forst.) Roem. & Schult., Syst. Veg. 2: 732. 1817, non *Festuca caespitosa* Desf., 1798. *Poa forsteri* Steud., Syn. Pl. Glumac. 1: 260. 1854. *Poa caespitosa* (G. Forst.) Hook. ex Speg., Anales Mus. Nac. Hist. Nat. Buenos Aires 5: 91. 1896, non *Poa caespitosa* Poir., 1804. TYPE: [Argentina. Province Tierra del Fuego]; [Isla de los Estados], Novi Anni insulis, *s.d.*, *Forster s.n.* (types, BM not seen, K!, KIEL not seen, LE [TRIN-2791.2!], UPS [T-2347] not seen, K [FORST] fragment at US 2851271!, W not seen).

Festuca urvilleana Steud., Syn. Pl. Glumac. 1: 312. 1854. TYPE: [Falkland/Malvinas Islands.] Ins. Maclov., "sec. specimen ex Herbo. *Urville* sub *F. flabellata* Lam.," *d'Urville s.n.* (holotype, P [URVILLE] not seen).

Poa controversa Steud., Syn. Pl. Glumac. 1: 260. 1854. *Poa controversa* var. *minor* Steud., Syn. Pl. Glumac. 1: 260. 1854. TYPE: Falkland Islands, Port William, "sub *Dactylis caespitosa*," [4 Sep. 1850], *W. Lechler* [(*Hohenacker exsiccata*) 106] (holotype, P [STEUD-385] not seen; isotype, P [STEUD] fragment at BAA not seen, P [STEUD-385] fragment at US 2851272!).

Sesleria americana Nees ex Steud., Syn. Pl. Glumac. 1: 296. 1854. TYPE: Argentina. [Province Tierra del Fuego]; [Isla de los Estados], Staten Island, Sep. [1829], *Chanticleer* [the ship], [W. H. B. Webster *s.n.*] (holotype, CGE [LINDL.] not seen).

Distribution and habitat. South Atlantic Ocean and Drake Passage to the Pacific Ocean, mainly or always on islands. Argentina (Isla de los Estados, SE Tierra del Fuego), Chile (Tierra del Fuego, Isla Diego Ramirez), Falkland Islands/Islas Malvinas, South Georgia Island, Tristan da Cunha (Gough Island) (Nicora, 1978; Groves, 1981; Moore, 1983). It was introduced and established in the Shetland Islands (Edmondson, 1980; Groves, 1981) and was probably introduced to Gough Island (Groves, 1981). Coastal

wet rocks, bluffs, and wet rocky slopes to 100 m, often associated with penguin colonies.

Notes. Reported from mainland Chile along the north side of the Straits of Magellan based on the *Commerson* type collection for *Festuca flabellata*. Moore (1983) indicates Commerson's collections from the Tierra del Fuego area were all from along the north shore of the Straits of Magellan and the adjacent Isla Isabella, in Chile. It is impossible to plot this collection precisely; moreover, the species has not been collected in this area since. Possibly the original location given on the *Commerson* label was in error. Only four other collection localities for the species from west of Isla de los Estados are known to us (three cited above, and one cited by Nicora, 1978).

Additional specimens examined. ARGENTINA. **Tierra del Fuego:** [SE end of Isla Grande], Policarpo, *R. N. P. Goodall* 2272 (BAB, NA, SI). CHILE. **Magallanes:** Cape Horn, Hermit Island, *J. D. Hooker* 68 (K); Isla Diego Ramirez, *E. E. Pisano-Valdés* 3405 (CONC). UNITED KINGDOM. **South Georgia Island:** *J. Smith* M-1148 (K). **Tristan da Cunha Islands:** Gough Island, *N. M. Wasce* G207 (K).

3. *Poa foliosa* (Hook. f.) Hook. f., Handb. N. Zeal. Fl. 338. 1864. Basionym: *Festuca foliosa* Hook. f., Fl. Antarct. 1: 99, t. 55. 1844 [1845]. TYPE: [New Zealand.] Lord Auckland's Islands: abundant, especially in rocky places near the sea, on the ground forming large green tufts on the cliffs never far from the sea. Dec. 1840, Antart. Exp. 1839–1843, *J. D. Hooker s.n.* (holotype, K [H203/00969-288!]; isotypes, fragment CHR 278601 not seen, LE not seen).

Distribution and habitat. New Zealand. Sub-Antarctic Islands: islets around Stewart Island, Solander Islands, Antipodes Islands, Auckland Islands, Campbell Island, and Macquarie Island (Edgar, 1986). Coastal wet rocks, bluffs, and adjacent wet slopes.

Notes. *Poa foliosa* is similar to *P. ramosissima* in its leaf blade architecture, as the adaxial valleys are very shallow between the costal ridges and are covered by papillate long cells. It is presumed to be closely related to *P. cookii*, which also has papillate long cells between its veins. *Poa foliosa* has a web on the callus of the lemma, whereas *P. cookii* does not. Chromosome number: $2n = 28$ (Edgar & Connor, 2000).

4. *Poa hamiltonii* Kirk, Trans. & Proc. New Zealand Inst. 27: 353. 1895. TYPE: New Zealand. Sub-Antarctic Islands, Macquarie Island, 1891. 4. *Hamilton s.n.* (holotype, K [H2003/00969-295!]; isotype, WELT 66728 not seen).

Distribution and habitat. New Zealand sub-Antarctic Islands: Macquarie Island (Edgar, 1986). Coastal wet rocks, bluffs, and adjacent wet slopes.

Notes. There are two collections at Kew with the same data. The holotype, K [H2003/00969-295], is a spindly plant that has the lacerate ligules of *Poa cookii*, and keys to this species, but in some respects approaches *P. ramosissima*. This sheet has “*Poa Hamiltonii* n.s.” [in Kirk’s handwriting?] and a diagnosis. A second sheet with the same collection information, K [H2003/00969-336]!, has only the determination “*Poa foliosa*,” and is that species.

Edgar (1986) placed *Poa hamiltonii* in *P. cookii* but noted that, in the Macquarie Island plants, the panicles are overtopped by the leaves and are somewhat narrower, and spikelets are on average slightly shorter. From the specimens on the four sheets we have seen from Macquarie Island, in addition to the differences noted by Edgar (1986), it appears that *P. hamiltonii*, unlike *P. cookii*, lacks prickly hairs on the sheaths and adaxial surfaces of the leaf blades. Thus, until we have reviewed other collections from Macquarie Island, we prefer to maintain this as a separate species closely related to *P. cookii*.

5. *Poa ramosissima* Hook. f., *Flora Antarctica* 1(1): 101. 1844. [1845.] TYPE: [New Zealand]. Hab. Lord Auckland’s Islands, “very common on the rocks overhanging the sea, trailing over banks, &c.,” [hangs down from the cliffs and rocks near the sea, common, very stoloniferous, Nov. 1840], *J. D. Hooker* s.n. (holotype, K [H2003/00969-298]!).

Distribution and habitat. New Zealand. Sub-Antarctic Islands, Auckland Islands, and Campbell Island (Edgar, 1986). Wet rocks and bluffs by the coast.

Notes. The specimens seen entirely lack prickly hairs, and both surfaces of the leaf blades are covered in papillate long cells. Papillate long cells are an anatomical feature characteristic of the adaxial blade surfaces of *Poa cookii*, *P. foliosa*, and *P. hamiltonii* but are not always expressed in *P. tennantiana*, and only weakly so in material examined of *P. flabellata*. Hooker identified two pubescence variations in the florets of *P. ramosissima*—one with a web on the callus and one without—but most material from both islands is webbed (Edgar, 1986). ITS DNA data place this species with *P. flabellata* (Gillespie & Soreng, unpublished data). Chromosome number: $2n = 28$ (Hair, 1968).

6. *Poa tennantiana* Petrie, *Subantarctic Is.* N. Z. 2: 467. 1909. *Poa foliosa* var. *tennantiana* (Petrie)

Cheeseman, *Man. N. Z. Fl.* (ed. 2) 188. 1925. TYPE: New Zealand. The Snares, 9 Jan. 1890, *T. Kirk* (lectotype, designated by Edgar, 1986, *New Zealand J. Bot.* 24: 188, WELT 36063 not seen).

Distribution and habitat. New Zealand South Island and New Zealand sub-Antarctic Islands: islets off Stewart Island, Snares Islands, Antipodes Islands, and Auckland Islands (Edgar, 1986). Coastal wet rocks and adjacent slopes.

Notes. *Poa tennantiana*, unlike *P. cookii*, *P. hamiltonii*, *P. foliosa*, and *P. ramosissima*, sometimes lacks papillae on the long cells of the leaf blade surfaces. (Edgar [1986] noted the adaxial leaf blade surfaces of this species were minutely papillose, but papillae were not seen in the material we examined.) Like the first two species, but unlike the latter two, it has glabrous calluses. It also has moderately deep narrow valleys and broad blocky ridges on leaf blade adaxial surfaces and pectinately scabrous sheaths as in *P. cookii* and *P. flabellata*. Chromosome number: $2n = 28$ (Hair, 1968).

TZVELEVIA REDUCED TO A SECTION IN POA

Poa* sect. *Tzvelevia (E. B. Alexeev) Soreng & L. J. Gillespie, comb. et stat. nov. Basionym: *Tzvelevia* E. B. Alexeev, *Byull. Moskovsk. Obshch. Isp. Priro., Otd. Biol.* 90(5): 103. 1985. TYPE: *Poa kerguelensis* (Hook. f.) Steud.

Notes. Monotypic.

Poa kerguelensis (Hook. f.) Steud., *Syn. Pl. Glumac.* 1: 257. 1854. Basionym: *Triodia kerguelensis* Hook. f., *Fl. Antarct.* 379, t. 138. 1847. *Festuca kerguelensis* (Hook. f.) Hook. f., *Philos. Trans.* 168: 22. 1879. *Tzvelevia kerguelensis* (Hook. f.) E. B. Alexeev, *Byull. Moskovsk. Obshch. Isp. Priro., Otd. Biol.* 90(5): 103. 1985. TYPE: [France. Kerguelen Islands]: Kerguelen’s land, “rocky places, at 300–1200 ft.” [on the debris of the rocks common “perennial” and alpine, Christmas Harbour, May 1840], *J. D. Hooker* 761 (holotype, K [H2003/00969-293]!; isotypes, CN not seen, CN CGE fragment at US 1127149!).

Distribution and habitat. Sub-Antarctic Islands of Indian Ocean: Heard Island and Kerguelen Islands. Wet rocky upland to alpine slopes. Reported also from Heard Island (*J. M. R. Hughes & R. D. Seppelt* 24053 [ADT not seen]; fide Australian Antarctic Data Center, 2007).

Notes. *Poa kerguelensis* was placed in its own genus, *Tzvelevia*, principally based on its having a long narrow hilum (Alexeev, 1985). The hilum seen in US material is actually between one fifth and one fourth the length of the fruit and narrowly ovoid, just at the long end of hilum lengths in species of *Poa*. We return it to *Poa*, as there is nothing else to distinguish the genus by, but note that it needs further study as to its position in the genus.

POA SECT. *Plicatae* FROM ARGENTINA AND CHILE IS PLACED IN
POA SECT. *Acutifoliae*

Poa sect. **Acutifoliae** Pilg. ex Potztal, Willdenowia 5(3): 473. 1969. TYPE: *Poa acutifolia* Hauman [= *P. planifolia* Kuntze].

Poa sect. *Plicatae* Pilg. ex Potztal, Willdenowia 5(3): 472. 1969. TYPE: *Poa plicata* Hack.

Distribution and habitat. Northwestern Patagonia from the province of Neuquén, Argentina, and adjacent valleys of the Andes of Chile (Coquimbo, Metropolitana, and Valparaíso), and Argentina north to the province of Salta, Argentina. *Poa acinaciphylla* (syn. *Poa villaroelii* Phil., fide Nicora, 1978; Soreng et al., 2003a): Argentina (Mendoza), Chile (Coquimbo, Metropolitana, and Valparaíso). *Poa planifolia*: Argentina (Mendoza), Chile (Metropolitana). *Poa plicata*: Argentina (Catamarca, La Rioja, Salta, and Tucumán; Negritto & Anton, 2000). *Poa stepparia*: Argentina (Neuquén; Nicora, 1978). Alpine stream margins and wet meadows and steppe, sometimes in subsaline conditions.

Notes. *Poa plicata*, the sole species of section *Plicatae*, is here formally placed in section *Acutifoliae*, which now contains four species: *P. acinaciphylla*, *P. planifolia*, *P. plicata*, and *P. stepparia*. The species have pungent leaf apices but otherwise have ligule margins and leaf blade surface anatomy typical of *Poa* (except for *P. stepparia*). Callus hairs, when present, arise from the dorsal side of the lemma as is typical for *Poa* (callus hairs in *P. stepparia* are not clearly distinct from the keel and marginal vein hairs), and the lemma surfaces are glabrous (except for hairs at the base of the keel and marginal veins in *P. stepparia*). The placement of *P. stepparia* needs further investigation.

Additional specimens examined. *Poa acinaciphylla*: ARGENTINA. **Mendoza**: Laguna de Solsneado, *P. M. Peterson* & *C. R. Annable* 11380 (US). CHILE. **Coquimbo**: Cordillera de Combarbala, Potrero Grande, *Jiles* 4829 (CONC). **Metropolitana**: Río Yerba Loca, *R. J. & N. L. Soreng* 7169 (CONC, US). **Valparaíso**: Laguna Castro, *Zoellner* 932 (CONC).

Poa planifolia: CHILE. **Metropolitanas**: above Embalse del Río Yeso, *R. J. & N. L. Soreng* 7160 (CONC, US).

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